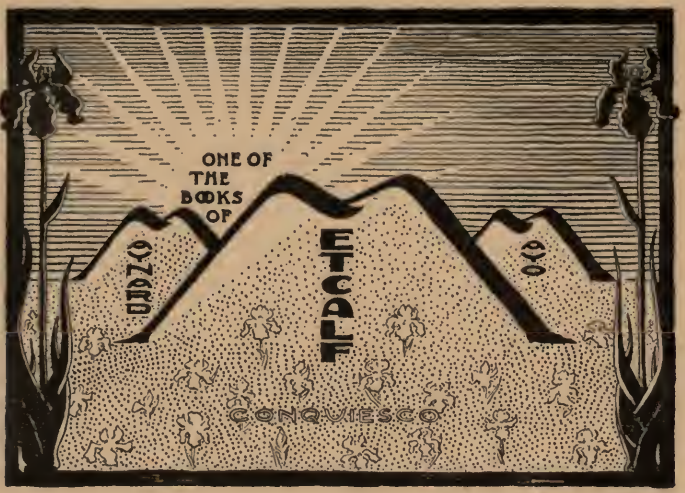
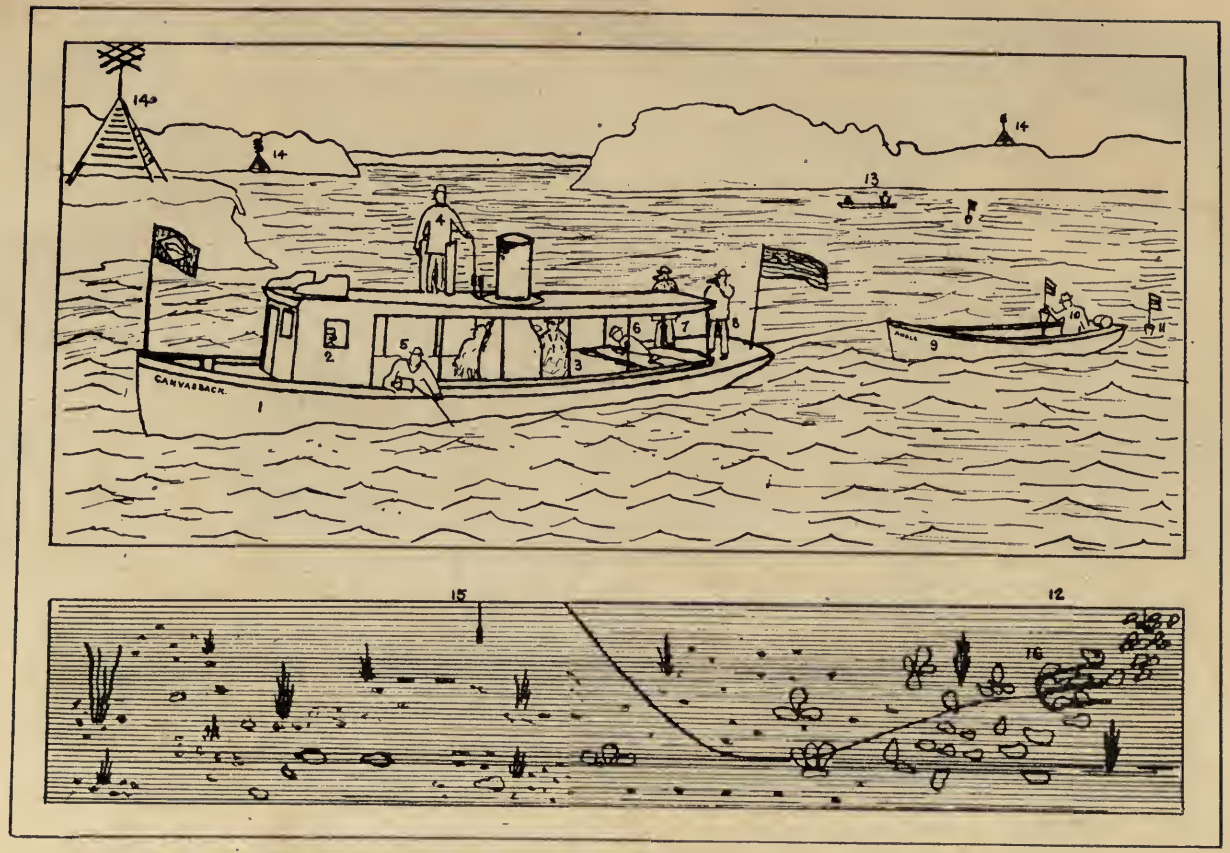

ONE OF
THE
BOOKS
OF
ETCALF
CONQUIESCO



SKETCH ILLUSTRATING METHODS OF CONDUCTING THE SURVEY OF THE OYSTER GROUNDS OF MARYLAND.

1. LAUNCH "CANVASBACK" (SURVEY BOAT). 2. COXSWAIN. 3. MACHINIST. 4. LEADSMAN. 5 LOCAL OYSTERMAN ATTENDING CHAIN-WIRE APPARATUS. 6. RECORDER. 7 AND 8. HYDROGRAPHIC ENGINEERS. 9. WATCH BUOY BOAT. 10. WATCH BUOY TENDER. 11. WATCH BUOY MARKING STATION FOR EXAMINATION. 12. RELIEF OF RIVER BOTTOM. 13. LAUNCH "INVESTIGATOR" ANCHORED AT STATION FOR EXAMINATION. 14. U. S. COAST SURVEY SHORE STATIONS OVER TRIANGULATION POINTS. 15. LEAD-LINE. 16. CHAIN-WIRE APPARATUS.

FIRST REPORT

OF THE

SHELL FISH COMMISSION

OF

MARYLAND

1907

1907
SUN JOB PRINTING OFFICE
BALTIMORE

SHELL FISH COMMISSIONERS.

WALTER J. MITCHELL, *Chairman*, La Plata.

CASWELL GRAVE, *Secretary*, Baltimore.
(Johns Hopkins University).

BENJAMIN K. GREEN, *Treasurer*, Westover.

CHIEF CLERK.

H. COURTENAY JENIFER, Towson.

ASSISTANT CLERK.

SAMUEL A. HARPER, St. Michaels.

STENOGRAPHER.

MISS BLANCHE RICHARDSON, Annapolis.

HYDROGRAPHIC ENGINEER.

SWEPSON EARLE, Centreville.

TABLE OF CONTENTS

REPORT

ANNAPOLIS, MD., October 1st, 1907.

His Excellency, Edwin Warfield, Governor of the State of Maryland, and Members of the General Assembly of Maryland of 1908.

GENTLEMEN:—The following Report[1] of the Board of Shell Fish Commissioners of Maryland, made in pursuance of the provisions of Section 119 of Chapter 711 of the Acts of 1906, of the General Assembly of Maryland, and, in substance, intended to embrace a summary of the work of said Board from the 10th of May, in the year 1906—the date of the qualification and organization of the Board of Shell Fish Commissioners of Maryland—to October 1st, 1907, is herewith submitted for your consideration.

Respectfully,

WALTER J. MITCHELL,
CASWELL GRAVE,
BENJAMIN K. GREEN,
The Board of Shell Fish Commissioners of Maryland.

[1]This report is in addition to, and in no way duplicates the report prepared under the supervision of Capt. C. C. Yates and published by the Coast and Geodetic Survey on June 20th, 1907, in compliance with Sections 86 and 89 of the Haman Oyster Culture Law, which said report embraces: a technical description of all boundaries and landmarks established in Anne Arundel County and contiguous waters by the Maryland Shell Fish Commission in co-operation with the United States Coast and Geodetic Survey; a progress map giving "the scheme of all charts and projections constructed in connection with the survey of the natural oyster bars, the location and names of all triangulation stations used as a basis for the surveying work, and the 'Boundaries of county waters' established by the Commission for the purpose of carrying out the laws relating to Oyster Culture;" and a series of four large charts showing the boundaries of all natural oyster bars, of the waters within the territorial limits of Anne Arundel County, and of the waters not within these limits, but opened for leasing with the waters of the County.

A similar report will, as soon as practicable, be issued under like preparation and authority, respecting the survey of the waters within the territorial limits, and contiguous thereto, of Somerset County.

Copies of these reports may be obtained by applying to the Superintendent of the Coast and Geodetic Survey, Washington, D. C.

LEGISLATION.

An Act, entitled "An act to establish and promote the industry of Oyster Culture in Maryland," to define and mark natural oyster beds, bars and rocks lying under the waters of this State, to prescribe penalties for the infringement of the provisions of the Act, and to add new Sections to Article 72 of the Code of Public General Laws of Maryland, to follow Section 82 and to be designated consecutively from Section 82 to Section 119, inclusive, was passed by the General Assembly of Maryland, of 1906, and received the official approval of His Excellency, Edwin Warfield, Governor of the State of Maryland, on the 2nd day of April, 1906, as will more fully appear by reference to said Act, fully published and submitted herewith,* and more specifically designated as Chapter 711 of the Acts of said General Assembly.

APPOINTMENT, QUALIFICATION AND ORGANIZATION OF THE BOARD.

Under the appointment provisions of Section 84 of the Act to which reference is herewith made, the appointment of the Board of Shell Fish Commissioners is lodged with the Board of Public Works of Maryland, with the restriction that "the said Board shall consist of three members, one of whom shall be a resident of one of the tidewater counties of the Eastern Shore of Maryland, another a resident of one of the tidewater counties of the Western Shore and the third a resident of the City of Baltimore, and one of whom shall be a member of the minority party at the time of their appointment," the term of each of the members of said Board being two years from the first Monday in May after his appointment, and one of said members being designated by the Board of Public Works as President of the Board of Shell Fish Commissioners.

Acting under the authority thereby vested with it, and in accordance therewith, the Board of Public Works of Maryland, consisting of His Excellency, Edwin Warfield, Governor of Maryland; Hon. Murray Vandiver, Treasurer of Maryland, and

*See page 214.

Hon. Gordon T. Atkinson, Comptroller of Maryland, on the 3rd day of May, 1906, appointed Walter J. Mitchell, of Charles County, from the Western Shore and Benjamin K. Green, of Somerset County, from the Eastern Shore, as majority members of the Commission, and Dr. Caswell Grave, of Baltimore City, as minority member of the Commission, for the period of two years, accounting from the first Monday in May, 1906, the Commissioner first named being designated by the Board of Public Works as President.

The Board, as so constituted, duly qualified before the Governor of Maryland on the 10th day of May, 1906, and forthwith proceeded to the discharge of the duties imposed upon it.

LOCATION OF OFFICE.

Through the courtesy of the Governor of Maryland a suite of offices in the State House Building was assigned the Commission for the accommodation of its force, the reception of its records and equipments, and for the like accommodation of Captain C. C. Yates, Assistant and Chief of Party, United States Coast and Geodetic Survey, and his assistants, and Dr. H. F. Moore, of the United States Bureau of Fisheries.

These offices, it is proper to state, have been ample for the purposes of the Commission.

APPOINTMENT OF HYDROGRAPHIC ENGINEER.

Mr. Swepson Earle, of Queen Anne's County, was appointed to the position of Hydrographic Engineer on the 17th day of May, 1906, at a salary of twenty-five hundred dollars per annum. Engineer Earle, connected at the time of his appointment with the United States Light House Service, reported for service with the Shell Fish Commission on the 22nd day of May, 1906.

APPOINTMENT OF CHIEF CLERK AND ASSISTANT CLERKS.

Under the provisions of Section 84 of the Oyster Culture Act, the Board of Shell Fish Commissioners on the 17th day of May,

1906, appointed H. Courtenay Jenifer, of Baltimore County, Maryland, Assistant Clerk, deferring the appointment of a Chief Clerk until, in its discretion, such an appointment became necessary.

Mr. Samuel A. Harper, of Talbot County, Maryland, was appointed Assistant Clerk on the 24th day of May, 1906, the appointment going into effect on June 1st, following; the salary of these two Assistant Clerks being fixed at the sum of one thousand dollars per annum, respectively.

For the more effectual organization of the office force, Assistant Clerk H. Courtenay Jenifer was appointed Chief Clerk of the Commission on the 8th day of February, 1907, at a salary of twelve hundred dollars per annum.

These two appointees, with the assistance of a stenographer and typewriter, in the person of Miss Blanche Richardson, of Anne Arundel County, Maryland, whose employment dates from the 12th of April, 1907, and whose compensation is ten dollars per week, form the office force of the Commission at this time.

APPOINTMENT OF COUNSEL.

Realizing that the construction, for the first time, of many sections of the Haman Oyster Culture Law, involving as they do legal questions of both magnitude and importance, would establish precedents, under which future operations of the law would be guided, the Commission on the 29th day of June, 1906, appointed Thomas H. Robinson, Esq., of Bel Air, Maryland, as its regular Counsel, the salary of Mr. Robinson being fixed at fifteen hundred dollars per annum.

Since this appointment many legal questions growing out of the operations of the law have been referred to him for construction, and his opinions in all legal matters have been strictly followed by the Commission.

The Commission herewith takes the opportunity to extend to its Counsel its appreciation of the uniform courtesy which has been accorded it by him, as well as the interest he has manifested, at all times, in every branch of the work of the Commission.

BOOKS OF RECORD AND FORMS.

The Office of the Board of Shell Fish Commissioners is equipped with the following books of record:

(a) A Minute Book, in which are accurately recorded all proceedings of the Commission.

(b) A Record of Application fees, in which are recorded all receipts from applications for oyster lots.

(c) A Record of Record fees, in which are recorded all receipts from recording leases of oyster lots.

(d) A Record of Rents, in which are recorded all receipts for rent from oyster lots.

(e) General Application Registers, in which are recorded detailed information as to the names of all lessees, the location of the lots applied for by them, respectively; the postoffice address of the applicant, date of application, date of lease and place of record thereof.

(f) A Resurvey and Adjustment Book, in which are accurately recorded descriptions of the readjustments made by the Engineers of the Commission of lots held under former law for the purposes hereinbefore set forth.

(g) Registers of Title to oyster lands, in which are recorded all leases of oyster lots leased by the Commission.

(h) And, finally, a complete set of mercantile books, in which are recorded, in regular double entry form, all receipts and disbursements of the Commission.

In addition to the form of application required of former lotholders,[2] it is deemed expedient to reproduce herewith, the several forms of application adopted by the Board of Shell Fish Commissioners, with reference to other classes of applicants, to wit: Riparian Owners; Boatmen, and Applicants Without Priority, under the Haman Oyster Culture Law. The same form of oath appended to the application to which reference is above made, is required to be made to each of the classes of applications following, and hence is omitted in the publication of the latter forms of application.

[2]See page 73.

FORM B.

APPLICATION FOR A LEASE

TO THE BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

ANNAPOLIS, MARYLAND.

The application of.....,
a resident of.....,in the State of Maryland, respectfully shows:

1st. That this applicant is a citizen of said State of Maryland, residing in.....in the State aforesaid.

2nd. That he wishes and intends to use the grounds hereinafter described for planting or cultivating oysters.

3rd. That at the time of the opening for oyster culture of the areas of said....., and at the present time,.....he was, and is, the owner of a certain lot, tract, piece or parcel of land, situate, lying and being on the waters of the....., in said State, having a water front of at least.....yards; and that the area adjacent to the riparian lands of this applicant was opened for oyster culturc as aforesaid within four months from date hereof.

The undersigned, therefore, requests hereby, that said Board lease to .....in the name and on behalf of the State of Maryland,.....acres of ground located under the waters of the State of Maryland, which ground is adjacent to the aforesaid land, as aforesaid, and is more particularly described as follows, to wit:

.....
.....
.....
.....
.....
.....
.....
.....
.....

Dated at....., Maryland, this.....day of....., in the year one thousand nine hundred and.....

.....

Applicant.

FORM C.

APPLICATION FOR A LEASE

TO THE BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

ANNAPOLIS, MARYLAND.

The application of.....,
a resident of.....,in the State of Maryland, respectfully shows:

1st. That this applicant is a citizen of said State of Maryland, residing in....., in the State aforesaid.

2nd. That upon the date of the opening for oyster culture of the areas of said....., or upon the closing date of the last dredging, scraping or tonging season, in said....., said date being not less than four months, and not more than ten months from date hereof, he was a boatman engaged in the business of dredging, scraping, or tonging for oysters within the areas of said State.

3rd. That he wishes and intends to use the grounds adjacent to a certain lot, tract, piece or parcel of land situate, lying and being in said .....County, having a water frontage of at least.....yards; the title to which said land is vested in a certain....., of.....

The undersigned, therefore, requests hereby, that said Board lease to him, in the name and on behalf of the State of Maryland,..... acres of ground, located under the waters of the State of Maryland, which ground is adjacent to the aforesaid land, as aforesaid, and is more particularly described as follows, to wit:

.....
.....
.....
.....
.....
.....
.....

Dated at....., Maryland, this.....day of....., in the year one thousand nine hundred and.....

.....

Applicant.

FORM D.

APPLICATION FOR A LEASE

TO THE BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

ANNAPOLIS, MARYLAND.

The application of....., *a resident of*....., *in the State of Maryland, respectfully shows:*

1st. That this applicant is a resident of said State.

2nd. That he wishes and intends to use the grounds hereinafter described for planting or cultivating oysters.

The undersigned, therefore, requests hereby, that said Board lease to.....*in the name and on behalf of the State of Maryland,*.....*acres of ground, located under the waters of the State of Maryland, which ground is more particularly described as follows, to wit:*

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Dated at....., *Maryland, this*..... *day of*....., *in the year one thousand nine hundred and*.....

.....

Applicant.

For the information of those interested in Oyster Culture in Maryland, the two forms of lease adopted by the Board are also published herewith. "Form A" was especially drafted for the purposes of leases to lotholders under former law; while "Form B" is designed for leases to all classes of lotholders, other than those covered by "Form A."

FORM A.

LEASE.

The Board of Shell Fish Commissioners of Maryland, pursuant to the provisions of Chapter 711, *of the Acts of* 1906, *and especially in accordance with the provisions of Section* 108, *Chapter* 711, *of the Acts of* 1906, *does hereby lease, in the name of the State of Maryland, this second day of April in the year nineteen hundred and seven, unto*.....
.....*for a term of twenty years, beginning on the second day of April, nineteen hundred and six, and ending on the first day of April, nineteen hundred and twenty-six; all that lot, piece, parcel or sub-division of land, situate, lying and being, in*....., *in*.....*County, in the State of Maryland, which according to a survey (and plat), made on the*.....*day of* ....., *in the year*....., *by a certain*.....
Surveyor, duly filed in the office of the Board of Shell Fish Commissioners of Maryland, is particularly described as follows, that is to say:

Said.....*hereby accepts the above Lease subject to all the provisions of the said Chapter* 711, *of the Acts of* 1906, *and especially subject to the payment of the rentals provided for in said Act.*

BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

By.....

President.

....., (SEAL.)

Signed, sealed and delivered in the presence of

.....

FORM B.

LEASE.

The Board of Shell Fish Commissioners of Maryland, pursuant to the provisions of Chapter 711, *of the Acts of* 1906, *does hereby lease, in the name of the State of Maryland, this.....day of ....., in the year nineteen hundred and ....., unto ..... for a term of twenty years, beginning on the .....day of..... nineteen hundred and ....., and ending on the..... .....day of ....., nineteen hundred and.....*

Said.....hereby accepts the above Lease subject to all the provisions of the said Chapter 711, *of the Acts of* 1906, *and especially subject to the payment of the rentals provided for in said Act.*

BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

By.....

President.

.....(SEAL.)

Signed, sealed and delivered in the presence of

.....

ASSISTANCE AND CO-OPERATION OF THE UNITED STATES COAST AND GEODETIC SURVEY AND OF THE UNITED STATES BUREAU OF FISHERIES.

Section 87 of the Act creating the Board of Shell Fish Commissioners of Maryland provides as follows:

"The Governor of this State is hereby requested to ask the assistance of the United States Coast and Geodetic Survey and the United States Fish Commissioner to aid in carrying out the provisions of the preceding Section" (of said Act).

Acting under this manifestly wise provision of the Act to which reference is above made, the Board of Shell Fish Commissioners forthwith took up the matter with Senators Rayner and Whyte, and with Representatives Gill and Mudd, all of Maryland.

Through the interest manifested on the part of the Maryland representatives in the United States Senate and House of Representatives, legislation was enacted by Congress enabling and directing the co-operation of the United States Coast and Geodetic Survey and of the United States Bureau of Fisheries with the Shell Fish Commission of Maryland, as follows:

[Act of Congress approved May 26, 1906.]

AN ACT to authorize the Secretary of Commerce and Labor to co-operate, through the Bureau of the Coast and Geodetic Survey and the Bureau of Fisheries, with the Shell Fish Commissioners of the State of Maryland in making surveys of the natural oyster beds, bars, and rocks in the waters within the State of Maryland.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Commerce and Labor be, and he is hereby, authorized and directed, upon the request of the governor of the State of Maryland, to designate such officers, experts, and empolyees of the Bureau of the Coast and Geodetic Survey and of the Bureau of Fisheries as may be necessary to co-operate with the Maryland State Board of Shell Fish Commissioners in making a survey of and locating the natural oyster beds, bars, and rocks in the waters within the State of Maryland; and the Secretary of Commerce and Labor is hereby authorized and directed to furnish to the officers, experts, and employees of said Bureaus so detailed as aforesaid such instruments, appliances, and steam launches as may be necessary to make the survey aforesaid; and the Secretary of Commerce and Labor is hereby authorized to have made in the Bureau of the Coast and Geodetic Survey all the plats necessary to show the results of the

aforesaid survey and the locations of the said natural oyster beds, bars, and rocks in the waters within the State of Maryland, and to furnish to the Board of Shell Fish Commissioners of the State of Maryland such copies as may be necessary, and for this purpose to employ, in the District of Columbia and elsewhere, such technically qualified persons as may be necessary to carry out the purpose of this act.

SEC. 2. That the Secretary of Commerce and Labor is hereby further authorized to have erected or constructed by the officers so detailed as aforesaid, while making such survey, such structures as may be necessary to mark the points of triangulation, so that the same may be used for such future work of the Coast and Geodetic Survey as the said Bureau may be hereafter required to perform in prosecuting the Government coast survey of the navigable waters of the United States located within the State of Maryland.

* * * * * * *

SEC. 4. That this act shall take effect from the date of its passage.

[Act of Congress approved March 4, 1907.]

AN ACT making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eight, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated for the objects hereinafter expressed, for the fiscal year ending June thirtieth, nineteen hundred and eight, namely: * * *

COAST AND GEODETIC SURVEY: * * * For any special surveys * * * including expenses of surveys in aid of the Shell Fish Commission of the State of Maryland, to be immediately available and to continue available until expended, twenty-five thousand dollars. * * *

The following correspondence bearing upon the subject of perfecting arrangements for securing the co-operation of the two departments of the United States Government, as hereinbefore set forth, will demonstrate the prompt manner with which the Executive Department of Maryland communicated with the Secretary of Commerce and Labor; as well, also, as the courteous and effective manner with which the communication of the Executive of Maryland was dealt by the Secretary of Commerce and Labor.

OFFICE OF THE SHELL FISH COMMISSION.

ANNAPOLIS, MD., May 24th, 1906.

HON. EDWIN WARFIELD,
Governor of Maryland, Annapolis, Md.

MY DEAR SIR: The Board of Shell Fish Commissioners is unofficially advised that the Act of Congress authorizing the United States Coast and Geodetic Survey to aid the State of Maryland in making the Oyster Survey, will likely be signed by the President today.

In accordance with Sec. 87 Chapter 711 of the Acts of 1906, therefore, I respectfully request your Excellency to make formal request for said aid, which seems to be contemplated by the Act, as speedily as may be convenient to you.

Very respectfully yours,
WALTER J. MITCHELL, *Chairman,*
Board of Shell Fish Commissioners of Maryland.

OFFICE OF THE SECRETARY OF STATE.

ANNAPOLIS, MD., June 1st, 1906.

WALTER J. MITCHELL, ESQ., *Chairman,*
Shell Fish Commission, Annapolis, Md.

MY DEAR SIR: In reply to your letter of the 24th instant, to the Governor, I beg to enclose, herewith, a copy of his letter to the Secrery of Commerce and Labor, from which you will see that he has complied with the request contained in your letter.

Yours very truly,
OSWALD TILGHMAN,
Secretary of State.

EXECUTIVE DEPARTMENT.

ANNAPOLIS, MD., May 28th, 1906.

HON. VICTOR HOWARD METCALF,
Secretary of Commerce and Labor, Washington, D. C.

SIR: Under the provisions of the Bill (H. R. 18435) recently passed by the Senate and House of Representatives, you are authorized and directed, upon the request of the Governor of the State of Maryland, to designate such officers. experts and employees of the Bureau of the Coast and Geodetic Survey and the Bureau of Fisheries, as may be necessary to co-operate with the Maryland State Board of Shell Fish Commissioners in making a survey of and locating the natural oyster beds, bars and rocks in the waters within the State of Maryland.

I, therefore, respectfully request that this designation be made by you, as provided above, and that I be advised of the names of the offi-

cers so designated, in order that the information may be trasmitted to the Maryland State Board of Shell Fish Commissioners.

Respectfully,

EDWIN WARFIELD,
Governor of Maryland.

OFFICE OF THE SECRETARY OF STATE.

ANNAPOLIS, MD., June 4th, 1906.

MR. WALTER J. MITCHELL, *President.*
Board of Shell Fish Commissioners, Annapolis, Md.

DEAR SIR: By direction of the Governor, I forward you herewith a letter from the Assistant Secretary of Commerce and Labor, which explains itself.

Yours very truly,

OSWALD TILGHMAN,
Secretary of State.

DEPARTMENT OF COMMERCE AND LABOR,
OFFICE OF THE SECRETARY, WASHINGTON.

June 2, 1906.

HIS EXCELLENCY, HONORABLE EDWIN WARFIELD,
Governor of Maryland, Annapolis, Md.

SIR: In reply to your letter of May 28th, requesting me to designate officers of the Coast and Geodetic Survey and of the Bureau of Fisheries to co-operate with the State of Maryland in making a survey of and locating the natural oyster beds, I have the honor to inform you that Mr. C. C. Yates will be designated to co-operate on the part of the Coast and Geodetic Survey as soon as Congress makes the provisions of the Act effective by providing an appropriation for the purpose.

Respectfully,

LAWRENCE O. MURRAY,
Assistant Secretary.

On July 3d, 1906, Capt. C. C. Yates, of the United States Coast and Geodetic Survey, was officially detailed by Superintendent O. H. Tittmann, of that Department, to "enter upon the duties of Coast Survey Representative on the Shell Fish Commission of Maryland," upon the proper surrender of the command, accounts, etc., of the Steamer Endeavor, then in command of Captain Yates, to the Hydrographic Inspector.

Pursuant to these orders, Captain Yates conferred with the Board of Shell Fish Commissioners, and pending the official

transfer of his former command, the preparation of his equipment and the selection and organization of his field party, greatly assisted the Commissioners in purchasing the side-wheel steamer, "Thomas L. Worthley,"[3] and in explaining and supervising the conversion of the "Worthley" into a houseboat for the accommodation of the surveying parties of both the Shell Fish Commission and the United States Government Assistants.

Active field work by the Coast and Geodetic Survey party was commenced on August 10th, 1906.

The efficient work of the Coast Survey Representative and his corps of assistants is best evidenced by the report and charts of the Survey of the Oyster Bars of Anne Arundel County, Maryland, published under the authority of the Department of Commerce and Labor—Coast and Geodetic Survey—in June, 1907, to which reference is herewith respectfully suggested.

The following communication forwarded to the Department of Commerce and Labor by His Excellency, Governor Warfield, will briefly explain the detail of Dr. H. F. Moore, of the Bureau of Fisheries, as the representative of that Bureau on the Shell Fish Commission:

EXECUTIVE DEPARTMENT, ANNAPOLIS, MARYLAND.

July 12th, 1906.

HON. VICTOR H. METCALF,

Secretary of Commerce and Labor, Washington, D. C.

MY DEAR SIR: On May 28th I addressed to you a communication requesting the co-operation of the Coast and Geodetic Survey and the Bureau of Fisheries with the Shell Fish Commission of Maryland, as authorized by the recent Act of Congress. You acknowledged receipt of this letter, stating that Captain C. C. Yates had been detailed from the Coast and Geodetic Survey for this work, as requested, but making no mention of the Bureau of Fisheries.

I have communicated with the Commissioner of Fisheries, and am informed that no instructions from you as to his co-operation with the Maryland Shell Fish Commission have been received, and that nothing can be done until you issue such instructions. The work of the Shell Fish Commission of this State is being seriously retarded by its failure

[3]See page 106.

to secure the desired assistance, and I would therefore request that you immediately assign to duty with the Commission, at such times as he may be needed, Dr. H. F. Moore, of the Bureau of Fisheries; and, further, that you will direct that a steam launch and crew be placed at the disposal of the Commission, for its use as provided by the Act of Congress referred to above.

Very respectfully,

EDWIN WARFIELD,
Governor of Maryland.

DEPARTMENT OF COMMERCE, OFFICE OF THE SECRETARY.
WASHINGTON, July 16th, 1906.

HIS EXCELLENCY, EDWIN WARFIELD,
Governor of Maryland, Annapolis, Md.

SIR: In reply to your letter of July 12th, I have the honor to say that under authority of an Act of Congress, approved May 26, 1906, I have this day directed the Bureau of Fisheries to detail Dr. H. F. Moore for work in connection with a survey of the Oyster Grounds of Maryland and to furnish and maintain a suitable launch and crew for the purpose of carrying out the provisions of the said Act.

Respectfully,

V. H. METCALF,
Secretary.

Dr. Moore, while not constantly employed in connection with his detail with the Shell Fish Commission, has been in constant touch and communication with the Commissioners, and rendered invaluable assistance in the work of the Commission, practically, as well as scientifically.

In this connection it is also proper to state that the use of the launch "Canvas Back" and crew, consisting of coxswain and engineer, from the Bureau of Fisheries, as a survey boat for the hydrographic survey party, has been of great assistance to the Commission, and resulted in a substantial curtailment of the expense incident to its work.

ASSISTANCE OF STATE FISHERY FORCE.

Section 97 of the Oyster Culture Act of 1906, providing that one of the steamers of the State Fishery Force shall be kept in commission under the command of the Deputy Commander and

subject to the control and direction of the Commissioners from the first day of April, in each year, until the first day of October following, has been observed by the Board of Public Works and the Commander of the State Fishery Force, the State Steamer "Governor P. F. Thomas" having been in the service of the Commission during the season of 1906, and the State Steamer "Governor R. M. McLane" having been in like service during the season of 1907.

The section of law providing for the assistance of the State Fishery Force, as above indicated, does not, in express terms, provide for the maintenance and wages of the crew of the State steamer while in the service of the Commission; and some question has arisen as to whether this item of expense is properly chargeable to the State Fishery Fund, or to the State special appropriation for the purposes of the Shell Fish Commission.

The Steamer "Governor P. F. Thomas," under the command of Deputy Commander James H. Turner, in response to the requisition of the Board of Shell Fish Commissioners, reported for service on June 28th, 1906, and remained with the Commission until September 28th of the same year.

During this period—covering about three months—the subsistence and wages of the crew of the "Governor P. F. Thomas" were entirely paid by the Shell Fish Commission, by direction of the Board of Public Works of Maryland, the amount of this item of expense to the Commission for the service stated being one thousand forty-nine dollars and eighty-three cents.

Realizing the expense incident to the maintenance of one of the State steamers while in the service of the Shell Fish Commission, a conference with the Board of Public Works was requested by the Shell Fish Commission before field operations for the season of 1907 were begun, and on the 27th of March, 1907, as a result of this conference, the following resolution was adopted by the Board of Public Works:

"*Resolved*, That the Secretary of the Board of Public Works be directed to instruct the Commander of the State Fishery Force to place at the disposal of the Board of Shell Fish Commissioners the steamer "Governor R. M. McLane," and that the

same be manned by a captain, mate, engineer, assistant, and two firemen, and furnished with coal and equipments at the expense of the State, in pursuance of the provisions of Section 97 of Chapter 711 of the Acts of 1906."

Under this order of the Board of Public Works, the Shell Fish Commission has been relieved of the extraordinary expense of maintaining the State steamer, further than the expense of furnishing subsistence for her crew, during the field season of 1907.

The Commission herewith extends its due appreciation of the uniform courtesy accorded it by Deputy Commander James H. Turner and the crews under his command during both seasons of field work.

LOCAL ASSISTANTS AND COMPENSATION OF SAME.

Under the provisions of Section 88 of the Haman Oyster Culture Law, the Commission has so far come in contact with, and had the co-operation of, the following local assistants, appointed by the respective Boards of County Commissioners of the counties opposite their respective names:

Anne Arundel County.....Joseph E. Smith.
Somerset County.....Thomas Dougherty.

The Commission has found both the gentlemen named to be well equipped with knowledge of the general location, extent and condition of natural oyster bars of their counties, especially in the localities in which they respectively reside; and the information which they have thus brought to the work of the survey has also been most advantageously supplemented by the invaluable assistance, in reference to existing and controlling social conditions in localities known to them, which they have at all times graciously accorded the Commission.

So far, the compensation to these local assistants of five dollars per day for each day actually engaged in the service of the Commission has been paid out of the general appropriation at the command of the Commission. The Commission at the outset of the survey in Anne Arundel County made demand for

reimbursement for money paid Mr. Joseph E. Smith on this account and, in an opinion of Hon. William Shepard Bryan, Attorney General of Maryland, courteously furnished the Commission, at the suggestion of the Counsel for the Board of County Commissioners of Anne Arundel County, who stated that he would recommend to his Board the adoption of such opinion as the Attorney General might render in the matter; the view is held that the County Commissioners, being clothed with the authority to appoint local assistants, were thereby liable for the compensation of their appointees; although the inference deducted from the opinion of the learned Attorney General is to the effect that there is nothing compulsory in the law requiring the appointments to be made by the respective Board of County Commissioners.

The opinion is hazarded, in view of the fact that the Haman Oyster Culture Law contemplates revenue for the State at large, that it would work some injustice to the tidewater counties to place upon them the cost of defraying the per diems of local assistants, and in consequence of this conflict of opinion, the Board of Shell Fish Commissioners has not pressed its claim against the Board of County Commissioners of the counties so far surveyed, although this item of expense, as will fully appear by reference to the financial statement furnished herewith, has been of considerable magnitude.

ASSISTANCE OF THE CITY AND COUNTY PRESS.

A chronicle of the assistance rendered the Commission through the several sources and agencies hereinbefore indicated, would be incomplete, upon a failure of the Commission to acknowledge, on behalf of the friends of the oyster culture in Maryland, as well as on its own behalf, its indebtedness to the forceful city and county press of Maryland for the uniform courtesy with which the Board of Shell Fish Commissioners of Maryland, in its official capacity, has been dealt.

Without exception the daily press of Baltimore City has been especially active in keeping the subject of Oyster Culture conspicuously before the people and it has been due to the intel-

ligent, efficient and discriminating manner with which that subject has been handled by the Baltimore City press, as supplemented by the more progressive weekly papers of the counties of Maryland, that public opinion has been favorably crystallized around enlightened methods and policies essential to the ultimate success of oyster culture in the State. This united action of the Maryland press has, doubtless, removed many obstacles which, otherwise, would have confronted the Board of Shell Fish Commissioners in promulgating and executing the law under which it was created.

It therefore follows, that the Commissioners, individually, as well as officially, are indebted to the press, and that indebtedness it re-affirms hereby, with due appreciation.

CONNECTICUT SHELL FISH COMMISSION.

In view of the courtesies extended the Maryland Shell Fish Commission at the outset of its work, by the Shell Fish Commission of Connecticut, the following extract from the 1906 report of the latter Commission, is published herewith. The extract quoted deals with the esteem with which oyster legislation of Connecticut is held by oyster culturalists, generally; and comments more particularly upon the visit of Commissioner Grave and Engineer Earle to the Shell Fish Commission of Connecticut, upon the inauguration of the work of the Shell Fish Commission in Maryland. In this connection the Maryland Shell Fish Commission desires to extend to the Connecticut Commission, its due appreciation of the cordial treatment extended its representatives, as well as to acknowledge its indebtedness for many valuable suggestions based upon both careful thought and experience, which have marked the growth of an enlightened oyster culture sentiment in the New England State.

"The estimation in which the oyster laws of the State of Connecticut are held by the law makers and oystermen of other States is a source of continual gratification to the Commission and the call for copies of our oyster laws is constant. The previous editions of the report in which the laws have been printed

having been long since exhausted, the Commission has, with the approval of the Board of Control, reproduced them from the Revised Statutes of 1902 down to date in an Appendix to the present report, and the Commission considers this a fitting time to introduce some matters illustrating the estimation in which our system of Shell Fish laws is held by other States whose oyster interests much exceed our own in extent.

"It is now about twenty-five years since the establishment of the present system of laws governing the shell fish business in the State of Connecticut and during that time there has been a constant improvement in the system, a continual readjustment through the knowledge gained by experience and a readaptation to the changing conditions, which conditions have advanced also, as the progressive and enterprising growers improved their apparatus and their methods. The basic principles are the same but many changes and readjustments, as has been said, have been made. During that period also the business has developed enormously and has come to be one of the important industries of the State. Other States whose waters afford even greater facilities for the growth and development of the oyster business, but in which it has been allowed to be carried on by the antiquated and inadequate methods of the past have watched the development of the industry in Connecticut and have sought to learn of her improved system of State management. The laws of this State governing the cultivation of shell fish have been sent to every State in the Union, which has any considerable shell fish interests and many of them have been incorporated into their own laws.

"Among the most recent of the States to adopt a new system and to find a part of the Connecticut methods of advantage is Maryland. While she looks upon her oyster grounds as a source of revenue to the State, as has always been her view, she still finds many of the Connecticut laws agreeable to her purpose and she has recently constituted a Shell Fish Commission which has charge of the management of her shell fish interests and the administration of her laws.

"In May, 1906, several members and other officers of this newly constituted Commission visited Connecticut to see and

study our system and certainly the encomiums passed by these officials, and they were scientific men and to a large extent experts, was something to rejoice the hearts of Connecticut men connected with the industry, officially and in a business way, who had labored diligently and continuously for many years to bring the system of Connecticut's laws and usages into a practical and satisfactory condition."

Upon the occasion of the visit of Commissioner Grave and Engineer Earle to Connecticut, Judge A. McC. Mathewson, who for a number of years was connected with the State Board of Shell Fish Commissioners, in speaking of the best method to be adopted in operating the Haman Bill in Maryland said:

"We have in Connecticut 8,000 acres of natural oyster beds. The trouble which we encountered was in defining these beds and drawing the distinction between the natural beds and barren bottoms. I understand that the same problems confront the Maryland Commission, and from the same causes. When, however, we established the line our troubles were over. The Supreme Court of this State rendered a decision confirming the boundaries of the natural oyster beds which had been defined by the Legislature and as soon as these exact boundary lines were established the rest was easy. Your Maryland Commission will make its task easy if it will definitely, finally and resolutely fix the boundaries of the natural beds.

"After we had established these boundaries the laying out of the barren lands became an easy task. The planters took up the land that was absolutely worthless and have transformed it into valuable beds.

"The greatest problem which the Maryland Commission must settle, and settle amicably and at once, is the controversy between what we call the 'natural growers' and the cultivators. It ought not to be difficult to settle this question. The 'natural growers' will soon be convinced that oyster cultivation is of the greatest benefit to them, and in five years they will be surprised that they so long opposed cultivation. They will find their opportunities greatly extended."

THE HAMAN OYSTER CULTURE LAW.

OBJECT.

The Legislature in placing Chapter 711 of the Acts of 1906, better known as the Haman Oyster Culture Law, upon the statute books of Maryland had a two-fold object in view:

1. To *encourage* an industry in oyster culture upon the *barren bottoms* beneath the tidewaters of the State.
2. To *prevent* the leasing of *natural oyster bars* for the purpose of oyster culture.

SURVEY.

To make the leasing of barren bottoms possible and the leasing of natural bars impossible, provision was made for a survey of the natural bars for the purpose of accurately locating and marking the same. It was definitely provided that no barren bottoms should be leased in any part of the State until the natural bars of that region had been surveyed, charted and marked with buoys.

NATURAL BAR NOT DEFINED.

The Shell Fish Commission is instructed by Section 90 of the Haman Oyster Culture Law to exercise its judgment liberally in favor of the natural bars when surveying, charting and buoying them, but other than this the Commission is uninstructed in this important matter. The responsibility of defining a natural bar is placed upon the Commission.

DEFINITION OF NATURAL OYSTER BAR.

DIVERSITY OF OPINION.

No definition of a natural oyster bar could be formulated by any man of body of men which would meet with the approval of all parties concerned. Oystermen, as a rule, hold that all bottoms where oysters grow or have grown naturally even though now practically barren of oysters should be considered natural bars. Other citizens of the State who are not directly interested in the oyster business, but interested in the oyster industry from the standpoint of revenue, hold, as a rule, that no bottoms should be excluded from leasing for oyster culture which, by methods known to oyster culturalists, may be made to yield a greater number of oysters than they now produce.

It should be evident to every one that neither of these definitions could be adopted by the Commission as a working basis for determining which of the grounds surveyed are natural oyster bars

THE GOLDSBOROUGH DEFINITION.

The definition of a natural bar which very nearly approaches a reasonable and satisfactory compromise between the extreme views given above and which has therefore been adopted by the Commission, is that contained in an opinion rendered by Judge Chas. F. Goldsborough in the Circuit Court for Dorchester county in the July term, 1881, in the case of William T. Windsor and George R. Todd, vs. Job T. Moore. It is as follows:

"What then is a natural bar of bed of oysters? It would be a palpable absurdity for the State to attempt to promote the propagation and growth of oysters and to encourage its citizens, by grant of land, to engage in their culture, if the lands authorized to be taken up were only those upon which oysters do not and can not be made to grow. That there may be lands covered by water in the State where no oysters can be found, but where, if planted, they could be cultivated successfully, may be possible, but, if so, I imagine that their extent must be too

limited for them to be of much practical, general advantage for the purposes of such a law as the one under discussion; but there are thousands of acres of hard and shifting sands where oysters not only are not found, but where it would be folly to plant them; and these latter it can not be supposed that the State intended to offer to give away, for the simple reason that the State could not help knowing that nobody would have them.

Upon the other hand there are large and numerous tracts where oysters of natural growth may be found in moderate numbers, but not in quantities sufficient to make it profitable to catch them; and yet where oysters may be successfully planted and propagated. In my opinion these can not be called natural bars or beds of oysters, within the meaning of the Act of Assembly, and it is just such lands as these that the State meant to allow to be taken up under the provisions of the above-mentioned section of the Act.

But there is still another class of lands where oysters grow naturally and in large quantities and to which the public are now and have been for many years in the habit of resorting with a view to earning a livelihood by catching this natural growth; and, here, I think, is the true test of the whole question. Land cannot be said to be a natural oyster bar or bed merely because oysters are scattered here and there upon it, and because if planted they will readily live and thrive there; but whenever the natural growth is so thick and abundant that the public resort to it for a livelihood, it is a natural oyster bar or bed and comes within the above-quoted restriction in the law, and cannot be located or appropriated by any individual."

APPLICATION OF DEFINITION.

FACTORS NECESSARY.

Much is left to be done after the adoption of this definition of a natural oyster bar before its application can be made to the oyster grounds surveyed. Not only must the actual condition of the grounds in question be accurately ascertained but also the conditions under which oystermen resort to the oyster grounds for the purpose of making a livelihood.

The facts to be ascertained concerning oyster grounds are:

1. The quantity of oysters they will yield.
2. The average number of oysters, as removed from the ground, required to fill a bushel measure.

The factors which must be taken into account in determining the minimum livelihood of an oysterman are:

1. Necessary annual expense.
2. Length of actual working season.
3. Total amount of bottom worked annually by an oysterman.
4. Price received by oystermen for oysters.
5. Quantity of oysters necessary to sell for the minimum livelihood of an oysterman.

The methods pursued to ascertain the facts and conditions necessary for the application of the Goldsborough definition of a natural oyster bar to the grounds surveyed by the Commission, and the conclusions arrived at in each case are fully set forth in the pages which follow.

SURVEY DATA INSUFFICIENT.

It became apparent early in the survey that the data secured on the hydrographic survey boat are valuable only for ascertaining the *outlines* of the oyster grounds and for giving a basis for determining the *relative values* of different grounds and different parts of the same ground. They furnish no

basis however for ascertaining even approximately the quantity of oysters on a given bottom. From the vibrations on the wire of the chain apparatus,* it is known that solid objects of some kind are on the bottom and, being above ground where oystering is or has been profitably carried on, the inference is that the objects causing the wire to vibrate are oysters. No one can be sure, however, that the vibrations on the wire are caused by *oysters* for the same result would be brought about if the chain were being dragged over coarse gravel, brickbats or shells. On more than one occasion during the survey an examination of a bottom by an oysterman showed that what had been recorded on the survey boat as a *dense growth of oysters* was in reality *stones*. To decide that all bottoms, on which the presence of oysters might be inferred from the chain and sounding records, are natural bars, would be to decide a most important matter on incomplete and doubtful evidence. Knowing that the data secured by the survey boat are insufficient for its guidance in ascertaining the status of the grounds surveyed, the Commission set about to develop a system of examinations whereby reliable data could be secured regarding the actual condition of the oyster grounds, and it is believed that the facts secured by the method adopted, when added to those secured by the survey boats, place the Commission in a position in which its action concerning an oyster ground of disputed status can be satisfactorily explained and defended.

EXAMINATIONS WITH DREDGE.

Lient. Francis Winslow, in the survey made by him in 1878 of the oyster bars of Tangier and Pocomoke Sounds, calculated the number of oysters per square yeard on the grounds surveyed from data secured by dragging a dredge of known width for a definite distance and time, over them.[4]

*See page 114.

[4]"Report on the Oyster Beds of the James River, Va., and of Tangier and Pocomoke Sounds, Md. and Va.," page 7, Report for 1881. Appendix No. 11, United States Coast and Geodetic Survey.

Skill and experience are most important factors in operating a dredge: Account must be taken at all times of the kind of bottom, the weight of the dredge, the speed of the boat and the length of the line, otherwise more oysters will be left on the dredged bottom than are brought away. Lieutenant Winslow states in his report[5] that the data secured and published by him are valuable only for a *comparative* study of the different oyster grounds. The *actual* amount of oysters per square yard on the ground covered could not be calculated from the results of his examinations. He is positive, judging from the quantities of oysters caught by oystermen, that the number of oysters really on the ground examined was many times the amount indicated by his examinations.

EXAMINATIONS WITH TONGS.

Knowing that examinations of oyster grounds by means of a dredge[6] are not valuable unless made by those expert in handling dredges, and that to secure an equipment for carrying out such a method satisfactorily would be very expensive, the Commission adopted a method for examining the grounds surveyed with tongs which has proved to be simple, reliable and inexpensive. Frequent comparisons have been made during the survey between the catch actually made per day by oystermen tonging upon a particular bar, with the amount which, according to the calculations made from the results of examinations, they should be able to catch, and in most cases the two amounts agreed remarkably closely.

[5]Page 8, of Winslow's report.

[6]A number of examinations with a dredge were made during the survey of the Somerset County oyster grounds in order to compare the present condition of certain bars with that which existed at the time of the survey by Lieut. Winslow and to compare the results obtained with tongs, with those with a dredge.

FIGURE 1.

THE "INVESTIGATOR" AS MANNED AND EQUIPPED FOR EXAMINING OYSTER GROUNDS.

THE TONGING METHOD.

STATIONS SELECTED AND MARKED.

The local oysterman, appointed in accordance with Section 88 of the Haman Oyster Culture Law to point out the oyster grounds to the Commission, usually selects the stations for examinations. He is in a position, while manipulating the chain apparatus on the survey boat,[7] to find the parts of the bottom which show its average condition. A spot having been selected for examination by the local oysterman, it is marked with one of the small flag buoys prepared for this purpose. Each buoy is marked with a number and when cast over at a station its number and its exact position on the line of soundings is recorded in the sounding record book.[8] Positions for examinations have sometimes been selected by a member of the Commission on the boat from which the examinations are made but the selection of positions in this way is avoided as much as possible since such positions are in no way connected with the lines of soundings and the results obtained at them therefore lack the value of comparative purposes which is possessed by those obtained at positions situated on a long line of soundings.[9] When positions were selected from the boat making the examinations they were located by a special set of angles and were later plotted on the survey boat sheets.

BOAT ANCHORED.

The boats[10] from which the examinations were made followed the survey boat over the grounds to be examined and anchored over the spots previously marked with the small flag buoys by the local oysterman.

---

[7]See page 116. [8]See page 117. [9]See page 118.

[10]Four boats, hired from oystermen, were used in making the examinations of the oyster grounds of Anne Arundel County. From the fact that these boats had to be rowed or towed from place to place the number of examinations it was possible to make was not so large as was desired. Toward the end of the season, therefore, a launch was hired to complete the work in Anne Arundel County and, before beginning the survey in Somerset County, the Commission purchased a speedy gasoline launch, the "Investigator," for this work.

In the examination boat were a tongman, a member or a representative of the Commission and one or more helpers.

OYSTERMEN EMPLOYED.

It was the desire of the Commission to have the examinations made in every case by a tongman who makes his livelihood during the tonging seasons by oystering on the public oyster grounds and one who is considered by his co-laborers a tongman of at least average ability. In all, six tongmen were employed at different times to make the examinations in Anne Arundel County:

	Examinations Made.
Robert Coats	27
Benjamin Ford	9
Curry Stallings	252
James Howard	4
Oscar Hartge	12
Joseph E. Smith	95
[11]Stallings and Hartge (Patent Tongs)	41
Total	440

In Somerset County, W. E. Revelle and W. H. Revelle made the examinations with tongs. When patent tongs or a dredge were used, W. S. Chelton assisted with the work.

Examinations with tongs	493
Examinations with patent tongs	112
Examinations with dredge	74
Total	679

In all cases when the depth of water permitted, ordinary tongs were used in examining the oyster grounds, but when the depth exceeded twenty-five feet patent tongs were used. As has been mentioned above, a dredge has been used to a limited extent in Somerset County, that a comparison might be made between the condition of certain grounds now and at the time

[11]Curry Stallings and Oscar Hartge.

of the Winslow survey, and to demonstrate that the tonging method is superior to a dredging method for ascertaining the facts desired.

The usual amount of time spent in making an examination at a station is ten minutes, but in some cases they cover fifteen minutes and at others a satisfactory result is secured in five minutes.

DATA COLLECTED AND RECORDED.

While the tongman is at work, the depth of water is measured and a sample of the water is collected from near the bottom and tested with a thermometer and salinometer to ascertain the amount of salts it contains. Measurements of the rate of flow of the currents are also frequently made. Specimens of water[12] are collected at each oyster ground and taken to the laboratory for future examination as to the quantity of oyster food contained.

As soon as the tonging is done the material, caught and placed on the culling board, is divided into four piles; the shells, culls (undersized oysters), oysters of medium size and large oysters being carefully separated, measured and counted. The results of each examination together with the number of the station, the amount of ground covered, the number of the flag buoy, the name of the tongman and the number of "grabs" made with the tongs, are recorded in a field record book, a specimen page of which is reproduced below.

MARYLAND SHELL FISH COMMISSION.

FIELD RECORDS OF EXAMINATIONS OF OYSTER BEDS.

County, Somerset.
Local Name of Oyster Ground, S. W. Middle Ground Bar.
Date, July 28, 1907.
Time, 2:42-2:49.
Angle, 23 E.
Depth, 19 feet.
Bottom, hard stony.

[12]See page 192.

Density, 1.009. *Temperature*, 73°.
Current, 50 feet=65 seconds.
Tongman, Revelle and Chelton.
No. Grabs Made, 4. *Tongs*, patent.
Total Area Covered, 4 square yards.
No. Oysters taken
—2.5 *inches*, 20.
2.5 *inches*—4 *inches*, 0.
4 *inches*, 0.
Quantity Shells, 25.
Result
Culls per square yard, 5.
Counts per square yard, 0.

At the close of each day the angles locating each station were added to the field record from the sounding record, and the entire series of records were transferred from the field record to the office record book.

UNITS OF MEASUREMENTS.

TIME.

At the beginning of the survey the tongman making the examinations was instructed to work ten minutes at each station and his results were recorded as a fractional part of an eight-hour day's labor. It was intended that the ground examined should be judged to be natural bar or barren bottom, according to the amount of oysters it would yield per eight-hour day, as based upon the amounts yielded at the places examined in the fractional parts of the day spent in tonging.

It soon became apparent, however, that there is a great difference in the amount of bottom covered in ten minutes by different tongmen and that the same tongman covers much more bottom when the water in which he is tonging is shallow than when deep. It is not so important that the *amount of time* spent at a station by the tongman be known as it is to know *how much ground* is worked over.

AREA.

To avoid the possibility of a very considerable error in the computations and conclusions concerning the condition of an oyster ground as a whole, based upon the condition of the areas examined, a unit of measurement of the results of the work at the stations was adopted which represents a fairly accurate quantity of bottom and is independent of the amount of time spent in tonging, or the ability of the tongman to work rapidly. With this unit the results of each examination are calculated and recorded in terms of oysters yielded per square yard.

TONGING UNIT—THE "GRAB."[13]

The tonging unit may be termed the "grab" and it can be shown to be the unit of all tonging operations.

A "grab" is made when a pair of tongs is placed upon the bottom, with the heads opened, and the shafts closed *once.* The area covered by this operation may be calculated by multiplying the length of the heads by the distance to which they are separated when placed on the bottom.

AREA OF "GRABS" VARIABLE.

Tongs used for work in shallow water are fitted with wide heads but for work in deep water, tongs with narrower heads are used. In shallow water it is possible, owing to the shortness of the shafts, to separate the heads much further before making a "grab" than it is when working in deep water with long-handled shafts. Thus it is seen that the area of the "grab" is a variable quantity, gradually decreasing as the depth of water increases (see figure 1). For the same depth of water however it remains fairly constant, making it possible to construct a table showing the area of the "grab" for depths of water varying from five to twenty-five feet. Such a table constructed from measurements of the tongs used by the Commission in Anne Arundel County, is reproduced on page 66. It is the one used in calculating the results of the examinations made of the oyster grounds in Anne Arundel County. In Somerset County new tongs were purchased and a new table, reproduced on page 67, therefore had to be made for use in calculating the results of the work done with them.

[13]The term "Lick" is used as frequently by tongmen as "Grab," as the unit of their work. A tongman makes a "Lick" when he delivers the contents of his tongs to the culling board. To fill his tongs, however, he may make one, two, three and sometimes several "Grabs," depending upon the depth of water, the velocity of the current and the quantity of oysters on the bottom.

FIGURE 2.

PHOTOGRAPH OF TONGS, SHOWING THE VARIATION WITH THE DEPTH OF WATER IN THE AREA COVERED BY A "GRAB."

1. 14-FT. TONGS AS OPENED FOR WORK IN WATER 5 FEET IN DEPTH.
2. 20-FT. TONGS AS OPENED FOR WORK IN WATER 15 FEET IN DEPTH.
3. 28-FT. TONGS AS OPENED FOR WORK IN WATER 25 FEET IN DEPTH.

FACTORS.

The length of the heads of a pair of tongs of course remains constant, but the width to which the heads are separated in making a "grab" depends upon several factors:

1. The height above the water at which the tongman grasps the shafts of his tongs.
2. The width to which he separates the shafts at the level of his hands.
3. The depth of water in which he is tonging.
4. The position on the shafts of the pin.

The first and second of these factors has been carefully determined by observing the tongmen employed by the Commission at work during the season and numerous tongmen at work on THREE SISTERS, TOLLEY POINT and HACKETT POINT bars. From these observations it was found that the average tongman usually grasps the shafts of his tongs at a point about *three feet* above the surface of the water, and in making a grab separates the shafts at the level of his hands, about *three and one-half feet.*

To find the distance between the teeth of the heads of the tongs, according to the above rule, in depths of water varying from five to twenty-five feet,[14] the tongs were placed in a horizontal position on a level surface and, while the shafts were properly separated, careful measurements were made of the distances to which the heads were thereby opened for every depth of water to which the tongs were adapted. See figure 2, page 43. The results of these measurements are recorded in the third column in the table on page 66. In the fourth column of the same table the area of a grab made with these tongs in the various depths of water is given.

There is no fixed rule for the position of the "pin" or "pivot" which fastens the shafts of tongs together, but it is usually placed at a point about one-fourth to one-third the length of the shafts, from the heads.

[14]Several years ago tongmen sometimes worked on oyster bars located in water as deep as thirty feet, but on account of the great difficulty in handling the heavy shafts needed there is now practically no tonging done in water deeper than twenty-five feet.

APPLICATION TO GROUND EXAMINED.

Knowing the area of each grab and the number of grabs made by a tongman at a given station, the number of square yards actually covered may be easily calculated and, knowing the number of oysters taken from this area, it is a simple matter to calculate the number of oysters removed per square yard.

EXAMPLE.

Let us suppose that twenty-four grabs are made by a tongman on a bottom covered by twelve feet of water and that forty-six marketable oysters are caught. The area of a grab at this depth is 2.93 square feet.[15] During the entire examination the area covered by twenty-four "grabs" is seventy square feet of 7.7 square yards. Forty-six oysters having been removed from this area, it follows that six marketable oysters per square yard were taken.

PATENT TONGS AND DREDGE.

The factor which made it difficult to calculate the area covered at a station with ordinary tongs (that of the variability in the area of the grab with the depth of water) is entirely absent from calculations of the areas examined with patent tongs or dredge.

With patent tongs the area of the grab remains constant, one square yard, in all depths of water. The heads of patent tongs are three feet in length and are separated and set to a distance of three feet before the tongs are lowered upon the bottom. The number of oysters taken at each grab is therefore the number which the ground will yield per square yard.

With a dredge also the width of the toothed bar remains constant and the area covered during an examination is found by multiplying this width (2 1-3 feet in the dredge used by the Commission) by the distance the dredge is towed on the bottom. In making an examination the dredge is placed upon the bot-

[15]See table, page 66.

tom at a flag buoy which has been dropped by the local oysterman and located by the hydrographic engineers. It is then towed by the launch in a definite direction by means of a range on shore, and its position when taken from the bottom is located by the person in charge of the examining boat by means of a set of sextant angles. The distance between the positions at either end of the line covered by the dredge is measured on the chart. The number of oysters per square yard on the area examined is found by dividing the total number of oysters caught by the total number of square yards covered.

NUMBER OF OYSTERS PER BUSHEL.*

COUNTS.

While sufficient quantities of oysters were frequently caught during the examinations to be measured more or less accurately, it was more often the case that the number taken was few and could only be recorded by number. It was therefore necessary to determine the average number of marketable oysters required to fill an oyster bushel measure in order to calculate from the results of the examinations the condition of the oyster grounds.

Oysters of all sizes, from two and one-half inches to more than five inches in length, are caught by oystermen when at work on the oyster grounds and thrown together, usually without reference to size. The number of oysters, just as they come from the grounds, was therefore that which the Commission desired for its computations and not the number of oysters of any given size required to fill a bushel tub.

No better way suggested itself to the Commission to ascertain the number desired than to take an average from all the measurements and counts made during the examinations of the oyster grounds in Anne Arundel County. By this method it was found that 329 oysters fill a legal oyster-bushel measure and this number was adopted by the Commission to represent one bushel of marketable oysters.

CULLS.

The estimate of the condition of the oyster grounds during the season following the survey, which is made in the tables on pages 140 and 176, is based upon the assumption that one-half of

*The dimensions of an oyster-bushel measure, as established by the Maryland Legislature, are: 16.5 inches across bottom, inside to inside; 21 inches diagonally from inside chime to inside top, and 18 inches across top, inside to inside. This measure has a capacity of 2800.6 cubic inches. The capacity of the standard bushel measure is 2150.4 cubic inches.

the undersized oysters found on the ground during the survey will have grown to marketable size and that one-third of the marketable oysters will remain. Many of the young oysters on the grounds at the time of the survey will die during the year following, and but few of them will have attained a length of four inches at the end of a year.

OYSTERS OF UNIFORM SIZE.

By another method for ascertaining the number of oysters per bushel, a large quantity of oysters of all sizes was carefully separated into groups of oysters of uniform size, and one-fourth bushel of each group was counted. The result of these measurements and counts is given, since it will prove interesting to some readers.

Supposing that, in making a day's catch on the grounds, an equal *volume* of oysters of each size is taken, each legal oyster-bushel would consist of 406 oysters.

Length of oysters.	Standard Bushel measure.	Legal Bushel measure.
2.5 inches.	632	821
3. "	400	520
3.5 "	240	312
4. "	180	234
5. "	112	145
	313	406 Average.

EQUIPMENT AND EXPENSE.

TONGMEN.

A natural oyster bar is a place to which oystermen resort for the purpose of making a livelihood. It ceases to be a natural bar when it no longer yields oysters in sufficient quantities to induce oystermen to resort to it for this purpose. To find an amount of money which represents the minimum livelihood for which oystermen will continue to resort to an oyster ground estimates, based upon information secured from oystermen, were made by the Commission of the annual expense to which oystermen are put in order to catch oysters for a livelihood.

The annual necessary expense of a tongman, according to information thus secured, is as follows:

Interest on an equipment valued at $200	$12.00
License to tong on the public oyster grounds	3.50
Repairs to boat, tongs, etc	9.50
Hire of boy to cull, 100 days at $0.75 per day	75.00
Living expenses for self and family, 237[16] days at $0.75 per day	177.75
Total	$277.75

Upon these figures the Commission based its decision that all grounds located in tonging districts in Anne Arundel County not in condition at the time surveyed to yield or to give promise to yield in the near future a sufficient quantity of oysters to tongmen to enable them to make a livelihood such as is represented by $277.75 per season are barren bottoms.[17]

[16]See page 57.

[17]One important exception to this rule has been made by the Commission to apply to all well-stocked oyster grounds located within areas designated for tonging, covered with water more than twenty-five feet in depth. All grounds so located, no matter how well stocked with oysters, are, according to the definition of a natural bar, barren bottoms for, due to their great depth, they are not resorted to by tongmen for

It is safe to say that no tongman who works regularly on the public oyster grounds makes less than $277.75 during a tonging season and that very few tongmen would continue to take out licenses to tong if they did not expect to get more than this amount for their season's work. By referring to the tongman's record, printed on page 55, it will be seen that the average wage per day for one tongman for three years was about $5.00, or nearly twice the amount ($2.78) which has been adopted by the Commission as the minimum wage for which tongmen can afford to resort to the public oyster grounds.[18]

DREDGERS AND SCRAPERS.[19]

The cost of equipping and operating boats of small capacity for dredging or scraping is much less than the cost of equip-

---

the purpose of making a livelihood. Should well-stocked grounds of this kind be thrown open for lease the spirit of the Haman Oyster Culture Law would be violated, for lessees of such grounds would immediately begin to *remove* oysters instead of to plant them, and the result would be to *decrease* instead of to *increase* the number of oysters in the State.

A reason sufficient in itself for the action of the Commission in designating such grounds natural bars is to be found in the important fact that undisturbed deep-water communities of oysters constitute great nurseries from which immense numbers of young oysters are annually furnished to the natural bars everywhere in the Bay and its tributaries. It is probably due, in great measure, to such nurseries that many of the bars in Anne Arundel County, so nearly exhausted a few years ago, have been re-stocked with an abundant set of young oysters during the last two years.

[18]The average annual earnings of Connecticut oystermen, as given in the fifth annual report of the Bureau of Labor Statistics of Connecticut, is $400.00. Two hundred and fifty dollars is the sum they expect to make from September 1st to December 1st, and one hundred and fifty dollars from March 15th to May 1st. During the remainder of the year they clam, fish and rest.

[19]An oyster *dredger* is one who operates wide, heavy dredges from a boat having a tonnage of ten tons or more. He pays a license of $3.00 per ton, for his boat, for the privilege of working on the dredging grounds located in *State* waters.

Scrapers operate small dredges from boats having a tonnage of ten tons or less. Their licenses, of $2.00 per ton, are issued by the counties in whose waters they work. At present three counties only issue scrape licenses. See page 61.

ping and operating those of greater tonnage. It follows, therefore, that the captain of a small vessel can afford to resort to an oyster ground for a much smaller quantity of oysters than the captain of a larger vessel.

This would seem to make any standard for dredging or scraping grounds which is based upon the quantity of oysters necessary to be caught per day or per season by a boat of one capacity, in order to make a livelihood for the owner, unfair for boats of different capacities. Large boats, however, are equipped with larger dredges than small boats and are therefore able to cover much more ground per day than small boats, and it was found by computation that the ratio between the amount of ground covered and the cost of equipping and operating a boat remains fairly constant for boats of all sizes.

The annual cost of equipping and operating a boat of 1,000 bushels (oysters) capacity was therefore taken as a basis for determining a standard for dredging and scraping grounds. It is as follows:

For equipment for dredging	$325.00
For labor and subsistence, 4½ months at $300.00 per month	1,350.00
For license, 20 tons at $3.00 per ton	60.00
Total	$1,735.00
For living expenses for Captain and family, 135 days at $0.75 per day	$101.25
Minimum livelihood	$1,836.25

All oyster grounds, situated within areas designated for dredging or scraping, in condition at the time surveyed to yield or to give promise to yield a quantity of oysters which will sell for the sum of $1,836.25 to boats of 1,000 bushels capacity during a dredging or scraping season, or a quantity per day in proportion, are considered by the Commission to be natural oyster bars.

LENGTH OF SEASON.

TONGING.

Tongmen are licensed to work on the public oyster grounds for a period of 237 days each year (September 1st to April 25th); but, on account of inclement weather, the amount of time actually spent by tongmen at work is very much less than this.

Two plans were followed by the Commission to ascertain the average amount of time annually spent by tongmen on the oyster grounds, first by consulting with tongmen, second by examining the records kept by the United States Weather Bureau of the weather conditions which have prevailed on the Chesapeake Bay during recent tonging seasons.

Letters were written to five tongmen who, there was reason to believe, keep a record of the time spent on the oyster grounds, requesting them to supply the Commission with copies of records covering as many years as possible showing the number of days spent each season in tonging and the number of oysters caught.

Replies were received from two of these men stating that complete records of their work had not been kept. No replies were received from two others, but from the other, Mr. Herman A. Woodfield, Shadyside, Md., a most valuable and interesting record covering five seasons, three of which are complete, was received. Reduced to a tabular statement, this record is as follows. (See page 55.)

At the expense of considerable time and labor, the Director of the Maryland section of the United States Weather Service, Mr. C. F. von Hermann, supplied the Commission with records collected at Baltimore, Cambridge, Solomons and Annapolis, showing the weather conditions which have prevailed in the upper part of the Chesapeake Bay during every day of the tonging seasons of 1903-1904, 1904-1905 and 1905-1906. From these records, all Sundays, all days when more than one-fifth inch of rain fell, all days when the wind blew with a velocity

equal to or greater than fifteen miles per hour and all days when the thermometer stood at or below twenty degrees (F.), were eliminated. The number of days remaining was taken to represent those when tonging might have been done. The following is a tabulated statement of the result of the study of the records furnished by the Weather Bureau.[20]

Digest of Weather Bureau records, showing the number of days available for tonging in Anne Arundel County during three seasons.

Tonging Season.	Month.	Sundays.	Week days when 1-5 inch rain fell.	Week days when temp. was 20° F. or below.	Week days when wind blew 15 mi. per hour.	Days left for work.
1903	September	4	2	0	4	20
and	October	4	7	0	7	13
1904	November	5	3	2	9	11
	December	4	2	6	10	9
	January	5	5	6	6	9
	February	4	3	12	6	3
	March	4	5	1	10	11
	April	4	3	0	6	12
						88
1904	September	4	2	0	4	20
and	October	5	2	0	7	17
1905	November	4	2	0	7	17
	December	4	4	8	6	9
	January	5	5	8	6	7
	February	4	1	11	6	6
	March	4	5	2	7	13
	April	4	5	0	6	10
						99

[20]When rain and wind occurred together the day was placed in the "rain" column only, and when a low temperature occurred with wind such days were placed in the "temperature" column only; duplication being thus avoided.

1905	September	4	3	0	8	16
and	October	5	3	0	10	13
1906	November	4	1	1	12	12
	December	5	5	0	5	16
	January	4	4	2	11	10
	February	4	4	4	8	8
	March	4	6	2	8	11
	April	4	2	0	7	12
						98
	Average for three years					95

Record of work by a tongman.

Season.	Month.	Number of days tonging.	Number bushels caught.	Amount received.
1901	September	9	99.	55.85
and	October	10	87.5	53.05
1902	November	15	166.5	98.70
	December	6	90.	48.20
	January	3	38.5	22.45
	February	1	10.	6.00
	March	9	80.	42.20
	April	12	71.5	42.95
		65	643.	$369.40
1902	September	21	163.	115.50
and	October	24	223.75	152.20
1903	November	19	157.50	121.80
	December	9	61.	47.96
	January	5	....	14.10
	February	6	155.[21]	30.45
	March	9	....	35.50
	April	7	....	31.45
		100	760.25	$548.76

1903 and 1904—Record incomplete, account of ill health.
1904 and 1905—Record incomplete.

[21]Number of bushels caught from January 1st to April 25th, estimated from price received.

1905	September	21	271.5[22]	21.40[22]
and	October	14	234.	150.00
1906	November	19	238.	94.45
	December	10	117.	106.10
	January	9	64.	41.50
	February	2	21.	15.15
	March	12	108.	58.15
	April	14	122.	14.10
		101	1175.5	$501.30
	Average, three seasons	88.6	859.5	$473.13

From the records furnished by the tongman it was ascertained that tonging was carried on 65, 100 and 101 days, respectively, during the tonging seasons of 1901-1902, 1902-1903 and 1905-1906.

From the Weather Bureau records it was calculated that tonging might have been carried on 88, 99 and 98 days, respectively, during the seasons of 1903-1904, 1904-1905 and 1905-1906.

The tonging season of 1905-1906 is the only one covered by both records, and it is worthy of note that the *calculated* number of days available for tonging (98) is very close to the *actual* number (101) during which a tongman worked. The very small discrepancy between the two may be accounted for on the supposition that the tongman may have worked on some occasions in the rain or wind or he may have counted parts of days when rain or wind came up after beginning the work for the day.

Calculated from the tongman's record, the *average* number of days during three years when tonging was done, is nearly 89. The average number, as calculated from the Weather Bureau records, is 95. In establishing a number of days to represent the tonging season, however, for use in determining the status of the oyster grounds surveyed, the Commission thought best not to take an average of the number of days when tonging had been or might have been done, but to take a number near that of the number of days available for tonging during the *best* season for which records were in hand. The

[22]Disagreement in number of bushels caught and price received, caused by the occasional bedding of oysters.

length of the tonging season adopted is therefore 100 *days of eight hours each.*[23]

DREDGING AND SCRAPING.

The period when dredgers are licensed to work on the public oyster grounds designated for dredging is from November 1st to March 15 (135 days). Scrapers have from October 15th to March 15th (151 days).

While wind, rain and cold do not prevent work with dredges and scrapes to quite the same extent that they interfere with tonging, yet it was the opinion of the oystermen consulted that a dredger or scraper does exceptionally well when he is able to do work during one-half of the days available for oystering. The dredging and scraping periods, adopted by the Commission for use in determining the status of grounds located in areas designated for dredging and scraping operations, are therefore 58 *days and* 65 *days,* respectively, these numbers being one-half the number of days available each season for dredging and scraping, Sundays excluded.

[23]The number of days per season spent by tongmen on the natural bars in Connecticut, as given in the fifth annual report of the Bureau of Labor Statistics of Connecticut, is 81, and the average quantity of oysters taken per day, 8.6 bushels.

AMOUNT OF GROUND COVERED.

BY TONGMEN.

On page 42 the unit of measurement of the work of tongmen and the method by which the dimensions of the unit are calculated are explained.

The amount of ground which a tongman of average ability is able to cover per day, expressed in terms of this unit, might have been easily reckoned from the observed and recorded work of the tongmen employed to make the examinations of the oyster grounds but, to make the estimate more accurate, the Commission made numerous observations of the work of several tongmen while engaged in tonging for a livelihood on *Three Sisters*, *Tolley Point* and *Hackett Point* bars, counting the number of grabs each tongman made during ten-minute intervals when working in various depths of water. The results of these observations are to be found in the averages given in column 4 in the table printed on page 65. In the column adjoining the above, the areas are given which, according to these observations, tongmen are able to cover during a season of one hundred working days.

A study of the results of these observations reveals the striking fact that a tongman can cover *sixteen times* as much ground per day or per season when working in water *five feet* deep as he can when working in water *twenty-five feet* in depth. Not only does the amount of ground covered at each grab diminish as the depth of water increases, but the number of grabs it is possible for a tongman to make in a given time is very much less in deep water than in shallow.

It is thus seen that the value of an oyster ground to tongmen depends not only upon how well it is stocked with oysters, but also upon the depth of water covering the oysters. A ground covered by water five feet in depth, stocked with twenty-two bushels of oysters per acre, is of as much value to tongmen as ground covered by water twenty-five feet deep,

stocked with three hundred and twenty-five bushels of oysters per acre.

Tongmen prefer to work on grounds located in shallow water, so long as such grounds yield a livelihood, not only on account of the greater area it is possible to cover, but also on account of the greater ease with which he can use short, light tongs. This, in part, accounts for the observed fact that oyster grounds located in shallow water are very much more depleted of oysters than grounds located in deep water, and that nearly all tonging grounds located in deep water are in excellent condition.

According to the survey made by the Commission, there are 33,676 acres of natural oyster bars in Anne Arundel County waters, of which 19,398 acres are designated for the use of tongmen. During the tonging season of 1906 and 1907 licenses were issued in Anne Arundel County to 847 tongmen. (See page 61.) To each tongman in the county there is therefore 22.9 acres of tonging ground.[24] According to the computations made by the Commission, however, a tongman can cover but about twenty acres per season, even should he work no ground located in water deeper than five feet. If the ground worked upon were all situated in water twenty-five feet in depth, he could cover but little more than one acre. Probably the average depth of water in which tongmen work during an entire season is about twelve feet. Under these conditions each tongman should be able to cover about eight acres of ground during a tonging season of 100 working days, or a little more than one-third of the ground available to him. It follows from the above that in Anne Arundel County it is not possible for the number of tongmen now licensed to cover the natural oyster grounds designated for tonging oftener than once in about three or four years.

[24] In Somerset County there are 9,346 acres of natural bars for the use of 513 *tongmen*, or 18.2 acres per tongman; 12,922 acres for the use of 428 *scrapers*, or 30.1 acres per scraper; and 5,458 acres for the use of *dredgers*, or about 101 acres per dredger.

BY DREDGERS AND SCRAPERS.

Although the following calculations of the areas covered per day and per season by dredgers and scrapers are based upon information which has not been verified by actual measurements from direct observations, they are accepted and have been used by the Commission because the data from which they were made were given to the Commission by men who are either now dredgers or have been engaged in dredging.

A dredge-boat of a thousand bushels capacity is usually equipped with a pair of dredges, each of which is not less than five feet in width. When engaged in dredging the boat each day sails over a series of courses aggregating a total length of at least thirty miles. For one-third of this distance both dredges are on the bottom. The amount of ground covered by the dredges per day may therefore be estimated as a strip ten feet wide and ten miles in length, or twelve acres.

When sailing to and fro over an oyster bar the strips of ground covered by a dredge-boat frequently overlap and very frequently the dredging apparatus becomes fouled and must be hauled in and freed. If for these laps and fouls one-third of the calculated area covered be deducted, *eight acres* of bottom remain as an average day's work for a dredge-boat of the above capacity, and this amount was adopted by the Commission as one of the factors to be used in determining the quantity of oysters which grounds designated for dredging must yield per square yard and per acre in order to be classed as natural oyster bars.

By reference to the table printed on page 61, it will be noted that licenses were issued to 544 dredgers during the dredging season of 1906 and 1907. The grounds on which these dredgers obtained their livelihood are located in the waters adjacent to the ten oyster-producing counties of the State, and there is no means by which the number of dredgers which worked on the dredging grounds in Anne Arundel County can be ascertained. It is assumed, however, that the dredgers were fairly evenly distributed between the counties and that one-tenth of the total number of dredgers—54—worked in Anne Arundel County waters.

The amount of oyster ground in Anne Arundel County designated for dredging operations is 6,953 acres,[25] or about 128 acres to each of the fifty-four dredgers.

Table Showing all Licenses[26] issued to Oystermen in Maryland during the season of 1906 *and* 1907.

County.	Tonging.	Scraping.	Dredging.
Anne Arundel	847	...	13
Calvert	733	...	23
Charles	197	...	1
Dorchester	1,168	401	83
Kent	449	...	..
Queen Anne	429	...	..
Somerset	513	428	320
St. Mary	1,015	...	50
Talbot	632	101	18
Wicomico	576	...	4
Worcester	No licenses required.		
Baltimore City	...	...	32
Total	6,559	930	544[27]

According to the estimate made above, a dredger is able to cover about eight acres per day and, in a dredging season of

[25]The area given in the report as that designated for dreging purposes in Anne Arundel County, is 14,278 acres, and this is the amount which has been chartered and buoyed by the Shell Fish Commission. The actual amount of this ground, however, which is oyster producing is 6,953 acres. The law (Section 90), requires that all natural bars shall be bounded by straight lines and, by reference to the table on page 140, it will be seen the process of thus bounding a natural bar, results in a considerable gain in acreage. The very great discrepancy, however, between the actual acreage of the dredging grounds and the area which has been buoyed, is to be found in the condition of the "Lumps, East of Craighill Channel." When surveying this dredging ground, which contained about 8,000 acres, it was found that about one-twentieth of the bottom only, or 400 acres, is oyster bearing. "Lumps" of oysters, varying in size from a few square yards to several acres, are scattered here and there over the entire area, but the barren bottoms between are not of sufficient size or value to have been excluded for the purposes of planting.

[26]The number of licenses issued during an oyster season, together with the minimum quantity of oysters for which oystermen can afford

fifty-eight days, he would cover a total of 464 acres, or more than three times the amount of ground available to each dredger.

It is a matter of observed fact, as well as of calculation, that dredgers practically exhaust the grounds available for dredging by the time the dredging season is one-third over and that those who continue to dredge longer than this go over ground already covered, one or more times. This accounts for the fact that dredging grounds are everywhere more depleted than tonging grounds.

A boat of 200-400 bushels capacity equipped for scraping usually carries scrapes three feet in width. During a day when average scraping conditions exist an area is covered about equal to a strip of bottom five feet wide and ten miles long, or six acres. Allowing one-third of this area, as in the case with dredgers, for laps and fouls, the average amount of ground covered per day is four acres. During the scraping season of sixty-five actual working days a scraper would cover about 260 acres but, as in the case of dredgers, this area is far in excess of the amount of ground available to each scraper.

---

to work, forms a better basis for estimating the total yield of oysters from the natural oyster bars of the State during an oyster season than is usually used for this purpose.

The following estimate of the total output of oysters from the public oyster grounds of Maryland during the season of 1906-1907, although about twice that hitherto made, is probably still considerably under the quantity of oysters actually gathered and sold, for, as far as the actual catch of oystermen has been ascertained, the indications are that very few oystermen did not catch more than the number of bushels taken as the average catch.

6,559	tongmen at 450 bushels each.....	2,951,550 bushels
930	scrapers at 1,500 bushels each.....	1,395,000 "
544	dredgers at 3,500 bushels each.....	1,904,000 "
	Total	6,250,550 bushels.

The output for the season of 1907-1908 promises to be even greater than that of the season of 1906-1907.

[27]All licenses to dredge for oysters are issued from the Comptroller's office at Annapolis. They are separated in the table to show the localities from which the owners of the boats hailed.

PRICE OF OYSTERS.

ANNE ARUNDEL COUNTY.

The price paid to oystermen for oysters, being governed by supply and demand, varies from month to month and from season to season.

From information gathered from oystermen, the Commission adopted sixty cents per bushel as a fair average price received by tongmen in Anne Arundel County during recent years.

SOMERSET COUNTY.

In Somerset County, however, the average price received by oystermen for oysters is much higher than the above, as the "barrel" stock from Pocomoke and Tangier sounds often brings as much as $1.25 per bushel. The price fixed by the Commission as the basis for determining the number of oysters which represents the minimum livelihood of oystermen in Somerset County is $1.00 per bushel.

QUANTITY OF OYSTERS.

TONGING GROUNDS.

With the foregoing data in hand it was decided by the Commission that all grounds located within areas designated for tonging operations in Anne Arundel County which will yield 462 bushels of oysters to tongmen per season, of 100 days of eight hours each, or a quantity of oysters proportional to this per day, are natural oyster bars, and all grounds located in the tonging districts in Somerset County are natural oyster bars which will yield 278 bushels of oysters to a tongman per season, or 2.78 bushels of oysters per day. The minimum quantity of oysters which must be present per square yard and per

acre on tonging grounds in Anne Arundel and Somerset counties, in order to yield the above amounts to tongmen per day and per season are shown in columns 5 and 6 of the tables printed on pages 65 and 66.

DREDGING AND SCRAPING GROUNDS.

Dredgers and scrapers are able to cover so much more ground than tongmen per season and per day that it is not necessary for dredging and scraping grounds to be so well stocked with oysters as tonging grounds in order to yield a livelihood to oystermen. A dredger with a boat of 1,000 bushels capacity by covering eight acres per day would cover 464 acres by the end of a season of fifty-eight working days. Each dredger, however, has but 128 acres (in Anne Arundel County) on which to make a livelihood and if, after working from sixteen to twenty days, he continues to dredge, he either covers ground already covered by himself or by other dredgers. Dredging grounds must be sufficiently well stocked therefore that 128 *acres* will yield, or give promise to yield in the near future, a quantity of oysters to a dredger, operating a boat of 1,000 bushels capacity, which can be sold for the minimum livelihood for such a dredger.

The minimum quantity of oysters on dredging and scraping grounds per square yard and per acre which, according to the information collected by the Commission, will supply a livelihood to dredgers and scrapers is shown in the table which follows. According to this standard, the dredging and scraping grounds surveyed and examined by the Commission have been gauged.

Table Used in Interpreting the Results of the Examinations and Determining the Status of the Oyster Grounds Surveyed in Anne Arundel County.

Tonging Grounds.

14-*Foot Shafts*—30-*Inch Heads.*

Water Surface to Bottom.	Spread of Teeth.	Area of "Grab."	Average No. Grabs per Minute.	Average Area per Season per Tongman.	Minimum Number Oysters Constituting a Natural Bar.	
					Oysters per Sq. Yd.	Bushels per Acre.
Feet.	Inches.	Sq. Yds.		Acres.		
5	32.00	.74	2.7	19.81	1.58	23.3
6	26.50	.61	2.7	16.48	1.89	28.0
7	22.00	.51	2.6	13.15	2.38	35.1
8	18.50	.42	2.6	10.82	2.88	42.6
9	16.00	.37	2.6	9.54	3.27	48.4
10	14.00	.32	2.6	8.25	3.80	56.0
11	12.50	.29	2.6	7.47	4.20	61.8
20-*Foot Shafts*—26-*Inch Heads.*						
12	16.25	.32	2.4	7.61	4.08	60.0
13	14.25	.28	2.2	6.10	5.13	75.7
14	12.50	.25	2.2	5.44	5.74	84.9
15	11.00	.22	2.0	4.56	7.19	105.9
16	10.00	.20	1.8	3.57	8.77	129.4
17	9.25	.18	1.8	3.21	9.76	143.9
28-*Foot Shafts*—26-*Inch Heads.*						
18	13.50	.27	1.4	3.74	8.38	123.5
19	12.25	.24	1.4	3.33	9.32	138.7
20	11.00	.22	1.4	3.05	10.51	151.4
21	9.75	.19	1.4	2.63	11.90	175.6
22	8.50	.17	1.0	1.68	18.65	275.0
23	7.50	.15	1.0	1.48	21.18	312.0
24	6.75	.13	1.0	1.28	24.49	360.9
25	6.00	.12	1.0	1.19	26.34	388.2
Dredging Ground.						
For all depths.....					1.60	23.9

Table Used in Interpreting the Result of Examinations and in Determining the Status of the Oyster Grounds Surveyed in Somerset County.

Tonging Grounds.

14-*Foot Shafts*—30-*Inch Heads.*

Water Surface to Bottom.	Spread of Teeth.	Area of "Grab."	Average Area per Season per Tongmen.	Minimum Number Oysters Constituting a Natural Bar.	
				Oysters per Sq. Yd.	Bushels per Acre.
Feet.	Inches.	Sq. Yds.	Acres.		
5	32.00	.74	19.81	.95	14.0
6	26.50	.61	16.48	1.13	16.8
7	22.00	.51	13.15	1.42	21.1
8	18.50	.42	10.82	1.73	25.6
9	16.00	.37	9.54	1.96	29.1
10	14.00	.32	8.25	2.27	33.6
11	12.50	.29	7.47	2.52	37.1
			22-*Foot Shafts*—26-*Inch Heads.*		
11	20.00	.40	9.52	1.97	29.2
12	18.25	.36	8.56	2.20	32.4
13	16.75	.33	7.20	2.61	38.6
14	15.25	.30	6.54	2.75	42.5
15	14.00	.28	5.55	3.38	50.0
16	12.75	.25	4.46	4.21	62.3
17	11.50	.23	4.10	4.60	67.8
18	10.50	.21	3.33	5.64	83.4
19	9.50	.19	3.01	6.27	92.3
			25-*Foot Shafts*—28-*Inch Heads.*		
19	10.40	.22	3.05	6.19	91.1
20	9.70	.20	2.90	6.49	95.8
21	9.00	.19	2.63	7.17	105.7
22	8.30	.18	1.78	10.58	156.0
			Dredging and Scraping Grounds.		
For all depths.....				.97	14.3

County.	Minimum Livelihood for 1,000 Ton Boat.	Ground Available for Each Dredger.	Minimum Number Oysters to Constitute Natural Oyster Bar.	
			Sq. Yd.	Acre.
Anne Arundel	3,066 Bu. Oysters.	128 A.	1 6 Oyst.	23.9 Bu.
Somerset.....	1,836 " "	128 "	.97 "	14.3 "

THE DEFINITION IN USE.

In the foregoing pages the factors adopted by the Commission for use in applying the Goldsborough Definition of a natural oyster bar to the grounds surveyed are enumerated and the methods are given by which each factor has been determined. Practical illustrations, taken from the Office Record of Examinations, are given below, showing the method of applying the definition. The first example is one of an oyster ground which does not come up to the required standard; the second is an example of a ground sufficiently well stocked with undersized oysters to justify placing it on the charts as a natural oyster bar, although marketable oysters were scarce at the time it was surveyed.

"JOYCE." 8 ACRES.

Date of Examination.	Depth of Water. Feet.	Area of "Grab." Sq. Yds.	Number of Grabs Made.	Total Area Covered. Sq. Yds.	Total Number Oysters Caught.		Oysters Caught Per Sq. Yd.		Minimum Number Oysters Per Sq. Yd. to Constitute a Natural Oyster Bar.	Minimum Quantity Oysters Per Acre to Constitute a Natural Oyster Bar	Estimated Quantity Oysters Per Acre. Bushels.		Remarks.
					Culls.	Counts.	Culls.	Counts.			1906-1907	1907-1908	
8,- 4,-'06.	17	.18	18	3.2	0	0	0	0	9.7	143.9 bu.	0.	0.	Depleted.
16,	13	.28	22	6.1	14	8	2.29	1.3	5 1	75.7 "	20.	16.5	"
"	17	.18	18	3.2	2	12	0.62	3.7	9.7	143.9 "	55.	5.	"
"	18	.27	14	3.7	0	0	0	0	8.3	123.5 "	0.	0.	"
"	15	.22	20	4.4	20	10	4.5	2.25	7.1	105 9 "	33.	34.	"
"	19	.24	14	3.3	0	0	0	0	9.3	138.7 "	0.	0.	"
"	19	.24	14	3.3	8	9	2.4	2.7	9.3	138.7 "	40.	18.	"
"	5	.74	27	20.	0	1	0	0.05	1.5	23.3 "	1.	0.	"
"	16	.20	18	3.6	3	0	0.83	0	8.7	129.4 "	0.	6.	"
Average,	15.4				5.2	4.4	1.18	1.1			16.5	8.8	

"WHITE HALL CREEK." 46 ACRES.

12,-11,'06.	7	.51	23	11.7	35	12	3.	1.2	2.3	35.1 "	18.	23.	O. K.
"	9	.37	23	8.5	3	7	0.35	0.82	3.2	48.4 "	12.	3.	Depleted.
"	7	.51	21	10.7	31	26	2.9	2.4	2.3	35.1 "	36.	22.	O. K.
"	8	.42	26	10.9	62	12	5.6	1.1	2.8	42.6 "	17.	42.	O. K.
"	7	.51	27	13.7	230	21	16.7	1.5	2.3	35.1 "	23.	120.	O. K.
"	8	.42	24	10.	675	54	67.5	5.4	2.8	42.6 "	80.	500.	O. K.
Average,	7.7				172.6	22	16.7	2.07			31.	118.	

SURVEY OF CRABBING GROUNDS.

In accordance with Section 96 of the Haman Oyster Culture Law the areas beneath the tide waters of Somerset County[28] where grass grows and it is profitable to scrape for soft shell or shedder crabs, have been designated on charts with the natural oyster bars and have been excluded from leasing for the purposes of oyster culture.

The approximate location and extent of crabbing grounds were pointed out by the local assistant to the hydrographic engineer, he being as familiar with the crabbing grounds as with the oyster-producing bottoms.

The verification by the hydrographic engineer of the location of these grounds and the determination of their limits was rendered easy in Somerset County by the fact that the period during which scraping for crabs was being carried on was the same (May 1 to October 1) as that covered by survey operations. No better evidence could be desired of the existence of a crabbing ground than the presence upon it of boats scraping for crabs and, by locating such boats at various places on each ground by sets of sextant angles and plotting the positions of the same on the charts, the extent of each ground was ascertained. To ascertain the exact limits of each ground lines were run in a launch or pulling boat over the edges of the ground and the point on each line where grassy and naked bottoms meet was located with sextant angles and plotted on charts.

The six-foot curve (mean low water) was found to mark approximately not only the outer limit for the growth of grass, but the inner limit for the growth of oysters and in many cases crabbing grounds were found to begin where oyster grounds ended: for example in Big Annemessex and Manokin Rivers and on the west side of Tangier Sound above Kedge Straits. In such cases the ins and outs of the lines marking

[28]It not being lawful to scrape for crabs in the waters of and adjacent to Anne Arundel County, the areas where grass grows in said County were not surveyed or charted.

the junction between grassy bottoms and oyster bottoms were not followed in establishing the boundaries of the crabbing grounds and oyster bars, but straight lines marking a mean between them were fixed as the boundaries.

The total area covered by crabbing grounds in Somerset County is about 28,498 acres. The location and extent of these grounds in the various sections of the county are given in the general description of the results of the survey beginning on page 145 and will be shown on the charts soon to be published by the U. S. Coast and Geodetic Survey.

LOTHOLDERS PRIOR TO THE PASSAGE OF THE HAMAN OYSTER CULTURE BILL.

Prior to the passage of the Haman Oyster Culture Bill, a number of oyster lots were located and appropriated by citizens of the State of Maryland, under what was commonly known as "The Five Acre Law," which in substance, required that such location and appropriation should be "described by stakes and bushes and that the name of the owner be placed on a board fastened to a pole or stake on or within the appropriated oyster land, or by the proper and visible metes and bounds, which description should be reduced to writing under the oath of some competent surveyor and recorded at the expense of the party locating or appropriating the same, in the Office of the Clerk of the Circuit Court for the county wherein such land may be located." (Section 46 of Article 72 of the Code of Public General Laws of Maryland.)

The Section of the Code above mentioned further provided that "No natural bar or bed of oysters should be so located or appropriated and that twelve months' peaceable possession of all locations of oyster grounds under the laws of this State shall constitute a good and sufficient title thereto." It also reserved to the riparian owners a priority of right to locate and appropriate in the waters adjoining the lands of such riparian owners, and required a notice of thirty days, in writing, to such riparian owner, from any other person desiring to locate or appropriate. While in some of the tidewater counties local statutes to some extent modified the general law of location and appropriation of oyster lots, as above outlined, it will be seen from an examination of this local legislation that the fundamental safeguards with reference to the number of acres that might be appropriated by any one lotholder; notice to riparian owners; the appropriation of natural oyster bed or bars, and the recorded description of the lot so appropriated, were practically maintained throughout the State at the time of the passage of the Haman Oyster Culture Bill.

It was doubtless in view of this previous legislation that Section 108 of the Haman Oyster Culture Act was adopted, and in carrying out the provisions of said Section the Commission has been confronted with some difficulty.

Section 108 of the Haman Oyster Culture Act reserved to all persons, who prior to the passage of said Act had "lawfully appropriated or taken up any land in this State, for the purpose of planting, bedding, or cultivating oysters thereon," the prior right to become the lessee of said land, under the provisions of the Oyster Culture Law of 1906; provided, however, that written notice of the intention of such person to become such lessee be given to the Board of Shell Fish Commissioners within six months from the passage of said Act; and provided, further, that upon failure of any former lotholder to give such notice within the time prescribed, the holding of any such person becomes void.

It was apparent at the outset to the Commission that a detailed investigation as to the lawful possession of each lotholder under former law was impracticable, and it was the sense of the Commission that Section 108 did not contemplate a specific investigation of the legality of the possession of each lotholder under former law.

In many cases it would have been found impossible to verify the compliance required of one class of these lotholders to give the thirty-day notice to the then riparian owner, and the work of determining these riparian owners would have also been tedious, difficult and expensive. The law authorizing the appropriation of oyster lots raised the presumption of a good and sufficient title thereto, in reference to the question of a natural bar or bed, upon twelve months' peaceable possession by the holder, and in consequence of this provision the Commission decided to accept the application of the former lotholder, upon the faith of the statements required by the form of application, under oath of the applicant, which it adopted, and which is published herewith, as follows:

FORM A.

APPLICATION FOR A LEASE

TO THE BOARD OF SHELL FISH COMMISSIONERS OF MARYLAND.

ANNAPOLIS, MARYLAND.

The application of....., *a resident of*....., *in the State of Maryland, respectfully shows:*

1st. That on the.....*day of*....., *in the year*....., *he lawfully appropriated and took up*.....*acres of land in the waters of the State of Maryland.*

2nd. That he desires to retain said land for the purpose of planting, bedding or cultivating oysters thereon, under the provisions of Section 108, *of Chapter* 711, *of the Acts of the General Assembly of Maryland of* 1906.

The undersigned, therefore, requests hereby that said Board lease ....*in the name and on the behalf of the State of Maryland, the aforesaid*.....*acres of ground located under the waters of the said State of Maryland, which said ground is particularly described in the Certificate of Survey thereof, duly recorded among the Land Records of*.....*County, in said State, the same, or a certified copy thereof, is filed with this application.*

Dated at....., *Maryland, this*..... *day of*....., *in the year one thousand nine hundred and*.....

.....

Applicant.

Finding it apparent that many lotholders under the former law were not cognizant of the provisions of Section 108, the Commission procured a list of the names and postoffice addresses of these lotholders from the Clerk of the Circuit Court of the several tidewater counties, and caused to be mailed to each of the addresses given, a circular letter upon which was reproduced Section 108 of the Haman Oyster Culture Bill, and in which special attention of the lotholder was called to the forfeiture clause of the Section.

Similar notices were also published in two papers, representing opposite political parties, in each of the tidewater counties of Maryland, and mailed to the postmasters throughout the tidewater section of the State, with the request that they be conspicuously posted.

The result attained by this method of notifying each lotholder under former law, needless to say, is disappointing to the friends of oyster culture, as from a total of 4,009 former lotholders to whom notice was mailed, as above stated, but 849 filed application for the retention of their respective lots within the period required by law, and of the total number so applying, but 311 have so far executed a lease to the State for the lot applied for.

This result, however, is to some extent explained by the fact that many former lotholders, knowing their right to lease *ten* acres or *one hundred* acres (dependent upon the location of the land they desired to lease), and being fully cognizant of the provisions of the law reserving to them priorities as riparian owners, deemed it expedient to defer the official notification to the Board, as contemplated by law, until after the waters of their respective counties shall have been surveyed and opened up for leasing purposes. In any event, the Board of Shell Fish Commissioners has exhausted every means of bringing notice to former lotholders of the rights especially reserved to them, and while strictly interpretating the law as to the express requirement of written notice, within six months from the passage of the Act, it has been the policy of the Board to deal liberally with this class of lessees, and hence it has permitted all who did not formally notify the Board upon the prescribed

form of application adopted by it, to amend an original notice after the period of six months from the date of the passage of the Haman Oyster Culture Act had elapsed, provided, of course, informal written notice was filed with the Board within the time prescribed.

Checking the Survey of Lots Held Prior to the Passage of the Haman Oyster Culture Law.

Owing to the inaccuracy of descriptions used in surveys made under the former law, as well as the fact that, in most cases, starting points used in these descriptions were found impossible to establish, the Commission has deemed it expedient to readjust the surveys of all former lotholders, so as to accurately locate them upon the leasing charts of the Commission, in accordance with latitude and longitude, and with reference to fixed triangulation stations and boundaries used as a basis of survey work; to the end that the descriptions and boundaries of this class of lotholders may be homogeneous with the Survey of the Natural Oyster Bars, as well also in harmony with the descriptions and boundaries which have, or may hereafter be used, or established, in reference to lotholders under the Haman Oyster Culture Law.

This work has been in charge of one of the assistant engineers of the Commission, in connection with the survey of oyster lots applied for in Anne Arundel County under the Haman Oyster Culture Law.

In Somerset and Wicomico counties, upon the beginning of the hydrographic work, special notice was sent to all lotholders under former law whose application for the retention of their lots were then on file in the office of the Commission, to supply missing stakes at the unmarked corners of their lots; and upon temporary leasing charts, made from smooth projections, the corners of these lotholders were plotted during the progress of the survey. The work of readjusting the surveys of these lots has been done in an accurate and painstaking manner, and while it has entailed much additional labor and sometimes incurred delay in the progress of the survey of natural oyster

bars, it is proper to state that in the absence of a verification of the surveys of oyster lots held prior to the passage of the Haman Oyster Culture Law, and the location thereof upon the regular leasing charts of the Commission in a manner and by a description similar to that which will be used in locating the lots of New Lotholders under the Haman Oyster Culture Law, many controversies growing out of the use of inaccurate and ambiguous descriptions of old oyster lots will now be averted.

While the descriptions in the leases to former lotholders are identical with those given in the original certificates of survey filed in the office of the Commission, an adjustment and resurvey book has been procured by the Commission, and therein will be recorded, for the settlement of future controversies, if any, arising out of the boundaries of lotholders under former law, the descriptions of these lots readjusted, as above indicated.

The number of oyster lots taken up prior to the passage of the Oyster Culture Act of 1906 applied for under the new law resurveyed and checked to October 1, 1907, are as follows:*

Anne Arundel County—
Applied for and resurveyed under old law..... 16
Applied for under new law..... 17
Surveyed under new law..... 12

Somerset County—
Applied for and resurveyed under old law..... 280

Wicomico County—
Applied for and resurveyed under old law†..... 33

*See pages 97 and 102.

†The lots in the remaining waters of Wicomico County will be resurveyed during the period occupied by the survey of the oyster grounds of the county.

APPLICANTS FOR OYSTER LOTS.

Alphabetical List, by Counties, of Applicants for the Retention of Oyster Lots, Held Under Former Law, as Required by Section 108, *of Chapter* 711, *of the Acts of* 1906, *Giving Postoffice Address, Location of Lot and Number of Acres Applied For.*

ANNE ARUNDEL COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Bast, William F.	Shady Side	West River	2.
Collins, S. A	Annapolis	Harness Creek	3.25
Corner, Theodore S.	Annapolis	Carr's Creek	5.
Dawson, J. W	Mayo	Rhode River	4.75
Davis, George A	Annapolis	South River	2.5
Duvall, Chas. Milton.	Annapolis	Harness Creek	4.75
DuBois, C. H	Annapolis	Severn River	5.
Gross, John T	Annapolis	Back Creek	3.375
Hutchings, Jas. B	Annapolis	Severn River	5.
Hartge, Edmund L.	Shady Side	West River	3.
Keidel, Henry	Severn Terrace	Severn River	5.
Keidel, Adelia L.	Severn Terrace	Severn River	3.
Kelley, L. P	Annapolis	Spa Creek	1.25
Larson, Charles	Shady Side	West River	3.25
Lerch, F. L	Baltimore	West River	6.75
Murray, James H.	Cumberstone	West River	5.
Murray, Mary H.	Cumberstone	West River	5.
Martin, Charles E.	Annapolis	Fishing Creek	5.
Martin, C. W	Annapolis	Spa Creek	4.875
Martin, John W	Annapolis	Fishing Creek	5.
Nowell, G. W	Annapolis	West River	2.5
Sanders, William H.	Annapolis	Severn River	5.
Sheckell, John R.	Annapolis	Harness Creek	5.
Worthington, J. M.	Annapolis	Clements Creek	5.
Wilde, William	Shady Side	West River	1.
Wilde, Ferdinand	Shady Side	West River	1.
Wells, John B	Annapolis	Spa Creek	3.25
Watts, Louis D	Washington, D. C.	Fishing Creek	5.
Wagner, Eliza M.	Annapolis	Chesapeake Bay	8.44

CALVERT COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Anderson, Charles	Solomon's	Patuxent River	5.
Allen, Thomas	Frazier	Patuxent River	1.4

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Abell, Combs	Solomon's	Patuxent River	.33
Bowen, Isaac P.	Wallville	Patuxent River	5.
Bowen, Helen V. M.	Wallville	Patuxent River	5.
Breeden, Laura V.	Prince Frederick	St. Leonard's Creek	3.5
Breeden, George L.	Soller's	Patuxent River	5.
Breeden, John E.	Soller's	Patuxent River	4.
Breeden, Jake E.	Soller's	St. Leonard's Creek	3.
Barrett, Christian	Frazier	Patuxent River	5.
Breeden, John W.	Soller's	St. Leonard's Creek	5.
Breeden, William E.	Soller's	Patuxent River	5.
Breeden, Barbara E.	Soller's	Patuxent River	5.
Brome, N. W.	Wallville	Patuxent River	5.
Brome, M. R.	Wallville	Patuxent River	5.
Bowen, Wise	Solomon's	Mill Creek	3.7
Bowen, Sarah E.	Solomon's	Patuxent River	5.
Bowen, Wise	Solomon's	Mill Creek	1.25
Blackburn, Wm. C.	Wallville	Patuxent River	5.
Barrett, Daniel	Soller's	Patuxent River	5.
Cooper, Frank	Solomon's	Patuxent River	5.
Cole, John	Solomon's	Patuxent River	1.5
Dodson, W. J., Jr.	Solomon's	Patuxent River	1.9
Dodson, W. J., Sr.	Solomon's	Patuxent River	1.6
Davis, M. M.	Solomon's	Patuxent River	5.
Dixon, Walter C.	Solomon's	Patuxent River	.6
Dixon, Webster	Solomon's	Patuxent River	.5
Evans, T. P.	Solomon's	Patuxent River	3.73
Files, George E.	Solomon's	Mill Creek	1.25
Gourley, Thos. B.	Baltimore	Patuxent River	3.75
Gantt, Wm. Warren.	Frazier	St. Leonard's Creek	1.25
Glover, J. W.	Solomon's	Patuxent River	2.85
Glover, R. M.	Solomon's	Patuxent River	3.2
Gantt, John B.	Lusby	Patuxent River	2.
George, J. F.	Solomon's	Patuxent River	4.5
George, Mary J.	Solomon's	Patuxent River	2.5
Hance, Young D.	Prince Frederick	Patuxent River	5.
Hill, Isaac	Solomon's	Patuxent River	.63
Johnson, Wesley	Solomon's	Patuxent River	5.
Joy, John B.	Solomon's	Patuxent River	2.66
Joy, Walter	Solomon's	Patuxent River	.67
Joy, Luther F.	Solomon's	St. John's Creek	5.
Jones, Edward H.	Solomon's	Patuxent River	3.19
Jones, John M.	Solomon's	Patuxent River	1.31
Joy, Edward	Solomon's	Patuxent River	.8
Johnson, Isaac	Solomon's	Patuxent River	1.6
Joy, Z. W.	Olivet	Spring Cove	3.13

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Kershaw, George	Baltimore	Patuxent River	4.33
Ketcham, Asa C	Solomon's	Patuxent River	5.
Ketcham, M. A	Solomon's	Patuxent River	5.
Kopp, John C	Solomon's	Mill Creek	5.
Lusby, George B	Solomon's	Patuxent River	1.13
Lore, Joseph C	Solomon's	Patuxent River	2.5
Lusby, Charles	Solomon's	Patuxent River	.6
Lusby, John E	Solomon's	Patuxent River	1.13
Millard, George	Solomon's	Patuxent River	5.
Moore, Thomas	Solomon's	Patuxent River	4.96
Moore, Thomas W	Solomon's	Patuxent River	4.96
Mister, John K	Solomon's	Patuxent River	1.88
Marburger, G E	Solomon's	Patuxent River	2,25
Northam, Wm. E	Solomon's	Patuxent River	5.
Oberry, John H	Solomon's	Patuxent River	2.
Overton, S. P	Solomon's	Patuxent River	5.
Overton, Chas. S	Solomon's	Patuxent River	5.
Overton, Wm. E	Solomon's	Patuxent River	5.
Overton, Daisy M	Solomon's	Patuxent River	1 a. 29 p.
Parran, M. D	Prince Frederick	Patuxent River	5.
Parran, Benjamin	Prince Frederick	Patuxent River	5.
Parran, Archibald	Prince Frederick	Patuxent River	5.
Parran, John	Prince Frederick	Patuxent River	5.
Parran, N. D. S	Prince Frederick	Patuxent River	5.
Railey, John	Solomon's	Patuxent River	2.46
Sullivan, P. J	Solomon's	Patuxent River	3.25
Seipp, Wm. A	Solomon's	Patuxent River	4.75
Sollers, James G	Soller's	St. Leonard's Creek	5.
Sollers, Catherine T.	Soller's	Patuxent River	5.
Sollers, John E	Prince Frederick	(Not given)	2.25
Tongue, Gideon G.	Solomon's	Patuxent River	5.
True, Thomas H	Solomon's	Patuxent River	5.
Turner, George D	Prince Frederick	Patuxent River	5.
Thomas, William	Solomon's	Mill Creek	1.22
Tongue, Frances H.	Solomon's	Patuxent River	1.75
True, John	Solomon's	Patuxent River	5.
Tongue, T. O	Solomon's	Patuxent River	5.
Tucker, Lemuel J	Solomon's	Back Creek	2.25
Tucker, James F	Solomon's	Patuxent River	2.38
Thomas, Sewell	Solomon's	St. John's Creek	3.9
Tongue, Frank	Solomon's	Patuxent River	3.
Woodburn, Benj. M.	Solomon's	Patuxent River	5.
Webster, John F	Solomon's	Back Creek	4.5
Webster, Sara E	Solomon's	Patuxent River	5.
Weems, Clarence	Solomon's	Patuxent River	4.75

CHARLES COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Alvey, W. H.....	Hughesville	Swanson's Creek.....	5.
Bowling, Fred. T....	Hughesville	Patuxent River.....	5.
Barbour, Philip J..	Rock Point.....	Wicomico River.....	5.
Barber, Jas. A.....	Rock Point.....	Wicomico River.....	5.
Barbour, Mary.....	Rock Point.....	Wicomico River.....	5.
Bowling, Henry R..	Bryantown	Patuxent River.....	5.
Collison, George....	Rock Point.....	Wicomico River.....	3.
Hayden, Wm. H....	Cooksey	Wicomico River.....	5.
Henderson, Alethea.	Benedict	Patuxent River.....	5.
Higdon, Francis W.	Issue	Wicomico River.....	2.5
Higdon, Jas. B.....	Issue	Wicomico River.....	2.5
Hayden, Henry A...	Tompkinsville	Wicomico River.....	5.
Jackson, Walter L..	Tompkinsville	Wicomico River.....	5.
Jackson, John C.....	Tompkinsville	Wicomico River.....	5.
Lawrence, Geo. F...	Aquasco, P. G. Co..	Swanson's Creek.....	5.
Lawrence, M. S.....	La Plata.....	Swanson's Creek.....	5.
Lancaster, S. S.....	Rock Point.....	Wicomico River.....	5.
Maddox, Verlinda G.	Wayside	Wicomico River.....	5.
Maddox, Rebecca D.	Wayside	Wicomico River.....	5.
Maddox, Francis J..	Wayside	Wicomico River.....	5.
Mandanyohl, N. H..	Tompkinsville	Wicomico River.....	5.
Norris, Jas. N.....	Rock Point	Wicomico River.....	3.65
Thomas, Jas. E.....	Benedict	Patuxent River.....	5.

DORCHESTER COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Ashton, Edward....	Hoopersville	Honga River.....	5.
Ashton, Lawrence L.	Hoopersville	Honga River.....	5.
Andrews, W. Guy...	Lakeville	Fishing Bay.....	5.
Adams, Jas. G.....	Hoopersville	Honga River.....	5.
Brannock, Edgar...	Cambridge	Little Choptank River..	4.05
Bennett, Wm. C.....	Cambridge	(Not given).....	5.
Barton, J. Fred.....	Cambridge	Hambrook's Bay.....	5.
Brannock, Annie L..	Cambridge	Little Choptank River..	2.15
Bosley, J. Hooper...	Cambridge	Slaughter Creek.....	5.
Bonds, Maria L....	Cambridge	Great Choptank River..	1.33
Booze, Robt. G.....	Hoopersville	Honga River.....	5.
Bradshaw, Jos. W...	Golden Hill.....	Honga River.....	5.
Bloodworth, R. E...	Cambridge	Lecompts Bay.....	5.
Creighton, Thos. H..	Fishing Creek.....	Tar Bay.....	5.
Creighton, Edith O..	Fishing Creek.....	Tar Bay.....	5.
Conway, Harvey H..	Cambridge	Great Choptank River..	3.65
Creighton, Sam'l M..	Fishing Creek.....	Tar Bay.....	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Clayton, John M.	Hoopersville	Honga River	5.
Crocheron, Trafena S.	Cambridge	Fishing Bay	5.
Collier, Effie M.	(Not given)	Sandy Island Cove	5.
Dashiells, Nora	Cambridge	Honga River	5.
Dashiells, W. J.	Taylor's Island	St. John's Creek	5.
Dashiells, Edwin	Cambridge	Hambrook's Bay	5.
Ewell, Wm. T.	Elliott	Fishing Bay	5.
Elliott, Vernum F.	Elliott	Fishing Bay	5.
Ewell, Solomon J.	Elliott	Fishing Bay	2.5
Evans, John W.	Elliott	Fishing Bay	5.
Evans, L. Raymond.	Elliott	Fishing Bay	5.
Elliott, Edwin J.	Elliott	Fishing Bay	5.
Elliott, Jesse E.	Elliott	Fishing Bay	2.
Elliott, Samuel J.	Elliott	Fishing Bay	5.
Elliott, William E.	(Not given)	Nanticoke River	5.
Foxwell, Wm. M.	(Not given)	Fishing Bay	5.
Gray, Alecke	Elliott	Fishing Bay	5.
Gray, James W.	Elliott	Fishing Bay	5.
Gray, Bessie	Elliott	Fishing Bay	3.75
Gray, Martha	Elliott	Fishing Bay	5.
Gray, Abihu	Elliott	Fishing Bay	5.
Gray, John W.	Elliott	Fishing Bay	5.
Gray, Cornelius	Elliott	Fishing Bay	5.
Gray, Garry H.	Elliott	Fishing Bay	5.
Gillis, L. B.	(Not given)	Nanticoke River	5.
Gillis, Alison A.	(Not given)	Nanticoke River	5.
Gillis, Laura A.	(Not given)	Nanticoke River	5.
Gray, Clara E.	Elliott	Fishing Bay	5.
Hooper, Wm. E.	Cambridge	Hambrook's Bay	5.
Hooper, Adelbert.	Hoopersville	Honga River	5.
Hurley, Celia	Vienna	Nanticoke River	5.
Hurley, Levin	Vienna	Nanticoke River	5.
Hurley, Elijah	Vienna	Nanticoke River	5.
Hurley, Sallie	Vienna	Nanticoke River	5.
Henry, Robert G.	Cambridge	Hambrook's Bay	5.
Harrington, Benj. E.	Taylor's Island	Slaughter Creek	5.
Hurley, William E.	Elliott	Fishing Bay	5.
Henry, Charles S.	Cambridge	Hambrook's Bay	5.
Hayward, Eliza E.	Cambridge	Cambridge Creek	.9
Horseman, Rebec. J.	Elliott	Fishing Bay	5.
Horseman, Loney.	Elliott	Fishing Bay	5.
Horseman, Chas. W.	Elliott	Fishing Bay	5.
Harrington, John L.	Annapolis	Tobacco Stick Bay	5.
Harrington, L. M.	Annapolis	Tobacco Stick Bay	5.
Harrington, R. P.	Annapolis	Tobacco Stick Bay	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Harper, Thos. A.	Crapo	Narrows Cove	1.
Jackson, Thos. J.	Cambridge	Fishing Bay	5.
Johnson, Jas. C.	Cambridge	Hambrook's Bay	5.
Jones, James W.	Elliott	Fishing Creek	5.
Jones, William C.	Bishop's Head	Goose Creek	5.
Jones, Sallie	Hoopersville	Honga River	5.
Jones, Harvey	Wingate	Ford Creek	5.
Keene, Guy	Madison	Tobacco Stick Bay	2.75
Kinnamon, C. Wil'd.	Elliott	Fishing Bay	5.
Kinnamon, Wilton T.	Toddville	Fishing Bay	5.
Kenly, Mary A.	(Not given)	Sandy Island Cove	5.
Lewis, Thomas	Hoopersville	Honga River	5.
Langrell, Louisa D.	Elliott	Fishing Bay	5.
Moore, Wm. W.	Elliott	Fishing Bay	5.
Moore, Herman W.	Elliott	Fishing Bay	5.
Mace, John	Cambridge	Hambrook's Bay	5.
Medford, William H.	Cambridge	Hambrook's Bay	5.
Moore, Delma	Elliott	Fishing Bay	2.5
Muse, William S.	Cambridge	Hambrook's Bay	5.
Moore, Alberry H.	Elliott	Fishing Bay	5.
Moore, Alonza M.	Elliott	Fishing Bay	5.
Moore, Pheby	Elliott	Fishing Bay	1.88
Murrell, Geo. W.	Hoopersville	Honga River	5.
Murrell, Susie R.	Hoopersville	Honga River	5.
Moore, Mary J.	Elliott	Fishing Bay	2.25
Mitchell, Robert H.	Cambridge	Lecompts Creek	5.
McCready, Sarah J.	Elliott	Fishing Bay	5.
McGlaughlin, Jno. H.	Fishing Creek	Honga River	5.
McGlaughlin, Nannie.	Fishing Creek	Tar Bay	5.
McGlaughlin, S. A.	Fishing Creek	Honga River	5.
Noble, Duncan L.	Taylor's Island	Slaughter Creek	5.
Noble, Virginia C.	Taylor's Island	Slaughter Creek	5.
Noble, Levi D. T.	Taylor's Island	Slaughter Creek	5.
Pain, William	Cambridge	Pope's Creek	5.
Phillips, Luther	Cambridge	Honga River	5.
Phillips, A. Nora	Fishing Creek	Honga River	5.
Phillips, Samuel T.	Crapo	Honga River	5.
Phillips, Albanus	Cambridge	Hambrook's Bay	5.
Phillips, J. W.	Toddville	Fishing Bay	5.
Phillips, Levi D.	Cambridge	Honga River	5.
Phillips, Samuel	Fishing Creek	Tar Bay	3.
Phillips, Florence	Cambridge	Honga River	5.
Phillips, Rufus	Crapo	Honga River	5.
Phillips, Charles W.	Crapo	Honga River	5.
Parks, Sarah J.	Hoopersville	Honga River	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Phillips, J. Riley...	Fishing Creek.....	Tar Bay.....	2.5
Robinson, John H..	Taylor's Island.....	Harper's Cove.....	5.
Robinson, S.....	Toddville	Fishing Bay.....	5.
Rippon, Thomas L..	Hoopersville	Honga River.....	5.
Robinson, Wm. G...	Toddville	Fishing Bay.....	5.
Robinson, B. A.....	Toddville	Fishing Bay.....	5.
Ruark, Henry W....	Hoopersville	Honga River.....	5.
Robinson, Callena...	Toddville	Fishing Bay.....	
Steele, Guy.....	Cambridge	Hambrook's Bay.....	5.
Seward, Alex., Jr...	James	Hudson Creek.....	5.
Seward, T. J. of A..	Cambridge	Brook Creek.....	5.
Slacum, Chas. E....	Taylor's Island.....	Slaughter Creek.....	5.
Shenton, Mollie T..	Taylor's Island.....	Slaughter Creek.....	5.
Shenton, John R....	Taylor's Island.....	Slaughter Creek.....	5.
Simmons, Rufus....	Hoopersville	Tar Bay.....	5.
Simmons, Avalon...	Hoopersville	Tar Bay.....	5.
Simmons, Samuel M.	Hoopersville	Honga River.....	5.
Simmons, Maggie L.	Hoopersville	Honga River.....	5.
Simmons, Dorinda..	Hoopersville	Tar Bay.....	5.
Spicer, Jas. K.....	Taylor's Island.....	Oyster Creek.....	5.
Seward, Mrs. Ella H.	Cambridge	Brooke's Creek.....	5.
Seward, Charles W..	Cambridge	Brooke's Creek.....	5.
Shepherd, James S..	Cambridge	Hambrook's Bay.....	5.
Shenton, Raymond..	Golden Hill.....	Honga River.....	5.
Spicer, Lingan T...	Golden Hill.....	Honga River.....	5.
Travers, Thomas H.	Fishing Creek.....	Honga River.....	5.
Turner, Oscar P....	Cambridge	Castle Haven Harbor..	5.
Turner, Llewella E..	Cambridge	Great Choptank River..	5.
Tyler, J. Foble.....	Hoopersville	Honga River.....	5.
Tyler, Samuel M....	Hoopersville	Honga River.....	5.
Travers, Mahala E..	Crapo	Honga River.....	5.
Travers, Matthew T.	Crapo	Joe's Cove.....	5.
Travers, Benj. F....	Fishing Creek.....	Tar Bay.....	5.
Travers, William R.	Hoopersville	Honga River.....	5.
Travers, Andrew E..	Hoopersville	Bentley's Cove.....	5.
Travers, Henry R..	Hoopersville	Tar Bay.....	5.
Travers, Jane.....	Hoopersville	Honga River.....	5.
Travers, Nora.....	Hoopersville	Bentley's Cove.....	5.
Travers, Levin F...	Hoopersville	Honga River.....	5.
Tyler, Kate.....	Hoopersville	Honga River.....	5.
Tyler, Stella.....	Hoopersville	Honga River.....	5.
Tyler, W. B.....	Hoopersville	Flag Cove.....	5.
Tyler, Minnie G....	Hoopersville	Honga River.....	5.
Tyler, H. Hanson...	Fishing Creek.....	Honga River.....	5.
Travers, Benj. H...	Fishing Creek.....	Tar Bay.....	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Tull, J. F.....	Cambridge	Madison Creek.....	5.
Travers, John E....	(Not given).....	Nanticoke River.....	5.
Vickers, Thomas H..	Taylor's Island.....	Parson's Creek.....	5.
Wilson, Thomas S..	Cambridge	Hambrook's Bay.....	5.
White, Clementine...	Hoopersville	Honga River.....	5.
Wroten, Levin A...	Cambridge	Honga River.....	5.
Wroten, Oliver P...	Golden Hill.....	Honga River.....	5.
Wallace, Charles W.	Fishing Creek.....	Honga River.....	5.
Wingate, C. C.....	Bishop's Head.....	Honga River.....	5.

SOMERSET COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Ashmead, Noah F...	Crisfield	Annemessex River.....	5.
Adams, Wm. J.....	Crisfield	Little Annemessex Riv.	5.
Adams, J. Fred.....	1314 N. Charles St., Baltimore.....	Marumsco Creek.....	5.
Bedsworth, S. J.....	Champ	Manokin River.....	5.
Bedsworth, Sallie H.	Champ	Manokin River.....	5.
Bedsworth, Henry A.	Champ	Manokin River.....	5.
Beauchamp, Jennie..	Upper Fairmount...	Manokin River.....	5.
Beauchamp, Vaughn.	Upper Fairmount...	Manokin River.....	5.
Bradshaw, Wm. J...	Crisfield	Somer's Cove.....	5.
Bowden, Edw. A. S..	Crisfield	Little Annemessex Riv.	5.
Blades, T. C.....	Crisfield	Little Annemessex Riv.	5.
Beauchamp, Wm. T.	Inverness	Manokin River.....	5.
Beauchamp, Arintha.	Crisfield	Little Annemessex Riv.	5.
Bradshaw, Jacob T..	Crisfield	Little Annemessex Riv.	5.
Bennett, S. J.....	Inverness	Manokin River.....	5.
Bennett, Geo. W....	Inverness	Manokin River.....	5.
Bennett, W. F.....	Inverness	Manokin River.....	5.
Bennett, Garnett....	Inverness	Manokin River.....	5.
Bennett, Ida.....	Inverness	Manokin River.....	5.
Bennett, Chas.....	Inverness	Manokin River.....	5.
Bennett, Fred'k L...	Inverness	Manokin River.....	5.
Bassford, Geo. W...	Upper Fairmount...	Manokin River.....	5.
Byrd, Wm. E.....	Crisfield	Little Annemessex Riv.	5.
Byrd, Elizabeth E..	Crisfield	Little Annemessex Riv.	5.
Byrd, Ruby E.....	Crisfield	Little Annemessex Riv.	5.
Burbage, Carrie R..	Crisfield	Little Annemessex Riv.	5.
Burbage, Dan'l A...	Crisfield	Little Annemessex Riv.	5.
Bozman, Thos. J....	Wenona	Manokin River.....	5.
Bozman, Hargus S..	Oriole	Monie Bay.....	5.
Bozman, Addeline...	Oriole	Monie Bay.....	5.
Bozman, Robert.....	Oriole	Monie Bay.....	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Baker, Louise T.	2008 Park Av., Balto.	Manokin River	5.
Bennett, E. S.	Inverness	Manokin River	5.
Cox, Elijah	Landonville	Manokin River	5.
Cox, Geo. A.	Fairmount	Broad Creek	5.
Cox, Effie K.	Upper Fairmount	Manokin River	5.
Cullen, James H.	Crisfield	Pocomoke Sound	5.
Cullen, Arintha J.	Crisfield	Pocomoke Sound	5.
Cullen, Manie A.	Crisfield	Pocomoke Sound	5.
Coulbourn, Jennie E.	Newark, N. J.	Little Annemessex Riv.	5.
Cochrane, Arthur B.	Crisfield	Little Annemessex Riv.	5.
Coulbourn, Wm. H.	Crisfield	Little Annemessex Riv.	5.
Crockett, Ananias R.	Crisfield	Little Annemessex Riv.	5.
Carson, Elsie	Crisfield	Little Annemessex Riv.	5.
Crockett, Alb'ngo R.	Crisfield	Little Annemessex Riv.	5.
Coulbourn, Isaac H.	Crisfield	Little Annemessex Riv.	5.
Crockett, Sallie	Crisfield	Little Annemessex Riv.	5.
Crockett, Lillian J.	Crisfield	Little Annemessex Riv.	5.
Coulbourn, B. C.	Crisfield	Little Annemessex Riv.	5.
Crockett, Marian	Crisfield	Little Annemessex Riv.	5.
Crockett, Carroll	Crisfield	Little Annemessex Riv.	5.
Cullen, Fred'k	Crisfield	Little Annemessex Riv.	5.
Cullen, Della	Crisfield	Little Annemessex Riv.	5.
Crockett, Alma	Crisfield	Little Annemessex Riv.	5.
Clayton, Mary A.	Marion Station	Pocomoke Sound	5.
Conner, Ralph A.	Tulls Corner	Pocomoke Sound	5.
Clayton, Sarah A.	Marion Station	Pocomoke Sound	5.
Conner, Eliza J.	Tulls Corner	Pocomoke Sound	5.
Conner, Nathan S.	Tulls Corner	Pocomoke Sound	5.
Conner, N. G.	Tulls Corner	Pocomoke Sound	5.
Coulbourn, Jas. E.	Crisfield	Little Annemessex Riv.	5.
Coulbourn, Lottie	Marion Station	Little Annemessex Riv.	5.
Coulbourn, W. C.	Marion Station	Little Annemessex Riv.	5.
Coulbourn, John W.	Marion Station	Little Annemessex Riv.	5.
Coulbourn, Annie M.	Marion Station	Little Annemessex Riv.	5.
Chelton Mary E.	Crisfield	Pocomoke Sound	5.
Cox, Lambert W.	Upper Fairmount	Big Annemessex Riv.	5.
Croswell, Julia A.	Crisfield	Pocomoke Sound	5.
Cochrane, Amy	Crisfield	Little Annemessex Riv.	5.
Coulbourn, Lena V.	Crisfield	Pocomoke Sound	5.
Chelton, W. S.	Landonsville	Manokin River	5.
Coulbourn, Julia	Crisfield	Pocomoke Sound	5.
Cox, Belle B.	Upper Fairmount	Big Annemessex Riv.	5.
Chaffey, Mary J.	Marion Station	Pocomoke Sound	5.
Cox, Lloyd W.	Marion Station	Pocomoke Sound	5.
Chaffey, Jno. G.	Crisfield	Pocomoke Sound	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No of Acres.
Cox, Rena B.....	Crisfield	Pocomoke Sound.....	5.
Cox, Algie B.....	Marumsco	Pocomoke Sound.....	5.
Cullen, Wm. E.....	Crisfield	Apes Hole Creek.....	5.
Cox, Wm. H.....	Marumsco	Pocomoke Sound.....	5.
Cullen, Mary E.....	Marumsco	Pocomoke Sound.....	5.
Coulbourn, Mary E.	Crisfield	Little Annemessex Riv.	5.
Cox, Elijah	Fairmount	Manokin River.....	5.
Cox, Henrietta M..	Marumsco	Pocomoke Sound.....	5.
Cox, John H.....	Marumsco	Pocomoke Sound.....	5.
Cox, W. B.....	Nanticoke	Ellis Bay.....	5.
Cox, Maggie.....	Nanticoke	Ellis Bay.....	5.
Chelton, William...	Crisfield	Pocomoke Sound.....	5.
Dougherty, Elij. T..	Crisfield	Pocomoke Sound.....	5.
Dayton, Millard L..	Mount Vernon.....	Monie Bay.....	5.
Dayton, Cora.....	Mount Vernon.....	Monie Bay.....	5.
Dougherty, Wm. E.	Crisfield	Pocomoke Sound.....	5.
Dougherty, G. Larry	Crisfield	Pocomoke Sound.....	5.
Dougherty, Grace...	Crisfield	Pocomoke Sound.....	5.
Dryden, Stallen....	Crisfield	Pocomoke Sound.....	5.
Dorman, Geo. E....	Crisfield	Pocomoke Sound.....	5.
Dorman, Addie F...	Crisfield	Pocomoke Sound.....	5.
Evans, Wallace C...	Crisfield	Little Annemessex Riv.	5.
Elmore, Carrie B...	Crisfield	Little Annemessex Riv.	5.
Elmore, Thos. S....	Crisfield	Little Annemessex Riv.	5.
Evans, Maggie S....	Crisfield	Little Annemessex Riv.	5.
Elmore, Fred'k P...	Crisfield	Little Annemessex Riv.	5.
Evans, Wm. W.....	Crisfield	Little Annemessex Riv.	5.
Elmore, Fred'k G...	Crisfield	Little Annemessex Riv.	5.
Fisher, Wm.....	Mount Vernon.....	Monie Bay.....	5.
Ford, Herschel.....	Upper Fairmount...	Manokin River.....	5.
Ford, Wm. R.....	Upper Fairmount...	Manokin River.....	5.
Gillis, Joshua.....	Upper Fairmount...	Manokin River.....	5.
Gillis, Sarah A.....	Upper Fairmount...	Manokin River.....	5.
Green, J. H.....	Marion Station.....	East Creek.....	5.
Gibson, Benj. F....	Crisfield	Little Annemessex Riv.	5.
Gorey, Jas. M.....	Marumsco	Pocomoke Sound.....	5.
Gibson, Wm. E.....	Crisfield	Little Annemessex Riv.	5.
Gibson, Mary A.....	Crisfield	Little Annemessex Riv.	5.
Gibson, Oliver P....	Crisfield	Little Annemessex Riv.	5.
Gibson, Eva A.....	Crisfield	Little Annemessex Riv.	5.
Gibson, Walter L...	Crisfield	Little Annemessex Riv.	5.
Gunby, Jesse A.....	Marion Station.....	Pocomoke Sound.....	5.
Gunby, Emma F....	Marion Station.....	Pocomoke Sound.....	5.
Gunby, Hall.....	Marion Station.....	Pocomoke Sound.....	5.
Horsey, John D....	Crisfield	Marumsco Creek.....	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Horsey, Geo. W.	Crisfield	Marumsco Creek	5.
Hopkins, Jas. F.	Mount Vernon	Monie Bay	5.
Hall, Martha E.	Upper Fairmount	Back Creek	5.
Holland, James	Crisfield	Little Annemessex Riv.	5.
Holland, Mary E.	Crisfield	Little Annemessex Riv.	5.
Hall, Alonzo C.	Marion Station	Annemessex River	5.
Holland, Elijah P.	Landonville	Annemessex River	5.
Hall, W. C.	Crisfield	Annemessex River	5.
Holland, Annie P.	Landonville	Annemessex River	5.
Hall, J. Henry	Marion Station	Annemessex River	5.
Hall, Ethel L.	Marion Station	Annemessex River	5.
Henderson, Wm. H.	Champ	Manokin River	5.
Honore, John E.	Champ	Manokin River	5.
Henderson, Mary E.	Princess Anne	Manokin River	5.
Howard, Francis	Hopewell	Pocomoke Sound	5.
Johnson, John S.	Crisfield	Pocomoke Sound	5.
Jones, Robert H.	Upper Fairmount	Manokin River	5.
Jones, Lizzie L.	Baltimore, Md.	Back Creek	5.
Kane, Edward	Fairmount	Manokin River	5.
Layfield, Gertie	Landonville	Manokin River	5.
Lawson, Jno. H.	Crisfield	Pocomoke Sound	3.
LaVallette, Amy	Crisfield	Little Annemessex Riv.	5.
Lawson, Lester	Crisfield	Apes Hole Creek	5.
Lockerman, F. S.	Landonville	Big Annemessex River.	5.
Lockerman, Sallie W.	Landonville	Big Annemessex River.	5.
Lawson, Elijah S.	Crisfield	Pocomoke Sound	5.
Loreman, Edna	Crisfield	Little Annemessex Riv.	5.
Loreman, Harold	Crisfield	Little Annemessex Riv.	5.
Loreman, James F.	Crisfield	Little Annemessex Riv.	5.
Loreman, J. F., Mrs.	Crisfield	Little Annemessex Riv.	5.
Long, Aurelius A.	Marumsco	Ellis Bay	5.
Long, Susan O.	Crisfield	Little Annemessex Riv.	5.
Long, Geo. W.	Crisfield	Little Annemessex Riv.	5.
Long, Frank P.	Crisfield	Little Annemessex Riv.	5.
Long, Marianna C.	Crisfield	Little Annemessex Riv.	5.
Long, Warren B.	Crisfield	Little Annemessex Riv.	5.
Long, Bessie M.	Crisfield	Little Annemessex Riv.	5.
Long, Clarence T.	Crisfield	Little Annemessex Riv.	5.
Lowe, B. W.	Crisfield	Little Annemessex Riv.	5.
Landon, Virginia	Landonville	Back Creek	5.
Landon, Wm. R.	Landonville	Manokin River	5.
Layfield, Geo. W.	Landonville	Manokin River	5.
Layfield, Mary P.	Landonville	Manokin River	5.
Lawson, Amelia	Crisfield	Little Annemessex Riv.	5.
Lawson, P. H.	Crisfield	Little Annemessex Riv.	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Lawson, W. P.	Crisfield	Little Annemessex Riv.	5.
Lockerman, C. A.	Crisfield	Little Annemessex Riv.	5.
Lockerman, Martha J.	Crisfield	Little Annemessex Riv.	5.
Lawson, James W.	Crisfield	Apes Hole Creek	5.
Lawson, Frank P.	Crisfield	Apes Hole Creek	5.
Landon, Walter G.	Balto. City	Manokin River	5.
Matthews, Chas. L.	Crisfield	Little Annemessex Riv.	5.
Miles, Edwin E.	Marion	Little Annemessex Riv.	5.
Miles, Wm. S.	Marion	Little Annemessex Riv.	5.
Miles, Corinne E.	Marion	Little Annemessex Riv.	5.
McGrath, John H.	Crisfield	Pocomoke Sound	5.
McGrath, Levin S.	Crisfield	Pocomoke Sound	5.
Muir, Mary E.	Crisfield	Little Annemessex Riv.	5.
Mills, Charles O.	Crisfield	Little Annemessex Riv.	5.
Morris, Frank H.	Marion	Pocomoke Sound	5.
Morris, Geo. W.	Marion	Pocomoke Sound	5.
Murrell, Alonza L.	Tulls Corner	Pocomoke Sound	5.
Miles, S. F.	Marion	Annemessex River	5.
Mister, Lawson	Shelltown	Pocomoke Sound	5.
Miles, Luther G.	Marion	(Not given)	5.
Mahoney, Jas. H.	Hopewell	Pocomoke Sound	5.
Mahoney, Sallie M.	Hopewell	Pocomoke Sound	5.
Muir, Wm. L.	Oriole	St. Peter's Creek	5.
Maddox, Fred S.	Marumsco	Pocomoke Sound	5.
McDaniel, Mathias J.	Oriole	Manokin River	5.
Nelson E. W.	Oriole	Pocomoke Sound	5.
Nelson, Harry T.	Oriole	Pocomoke Sound	5.
Peyton, Wm. J.	Oriole	Little Annemessex Riv.	5.
Peyton, Margt. E.	Oriole	Little Annemessex Riv.	5.
Peyton, Orrie F.	Lawsonia	Apes Hole Creek	5.
Peyton, Eva B.	Lawsonia	Apes Hole Creek	5.
Purnell, Isaac J.	Crisfield	Apes Hole Creek	5.
Pruitt, John E.	Crisfield	Little Annemessex Riv.	5.
Quinn, Katie E.	Crisfield	Little Annemessex Riv.	5.
Quinn, Egbert L.	Crisfield	Little Annemessex Riv.	5.
Quinn, Larie C.	Crisfield	Little Annemessex Riv.	5.
Quinn, Clara H.	Crisfield	Little Annemessex Riv.	5.
Richardson, Wm. S.	Marion Station	Pocomoke Sound	5.
Richardson, Ruth.	Marion Station	Pocomoke Sound	5.
Richardson, Ella H.	Marion Station	Pocomoke Sound	5.
Richardson, Neuman	Marion Station	Pocomoke Sound	5.
Richardson, Eva L.	Marion Station	Pocomoke Sound	5.
Richardson, H. E.	Marion Station	Pocomoke Sound	5.
Riggin, Laura V.	Crisfield	Little Annemessex Riv.	5.
Riggin, Geo. C.	Crisfield	Little Annemessex Riv.	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Robertson, S. H. Jr.	Westover	Little Annemessex Riv.	5.
Riggin, Charles E.	Crisfield	Big Annemessex Riv.	5.
Revell, Robt. F.	Inverness	Manokin River	5.
Revell, Sam'l S.	Inverness	Manokin River	5.
Riggin, Horace.	Crisfield	Little Annemessex Riv.	4.8
Riggin, Elisha T.	Crisfield	Little Annemessex Riv.	4.2
Riggin, Annie E.	Crisfield	Little Annemessex Riv.	5.
Riggin, John H.	Crisfield	Jenkins Creek	5.
Sterling, Hiram L.	Crisfield	Little Annemessex Riv.	5.
Sterling, Archie.	Crisfield	Seine Creek	5.
Sterling, Edward.	Crisfield	Seine Creek	5.
Sterling, Daisy.	Crisfield	Seine Creek	5.
Sterling, Mary C.	Crisfield	Seine Creek	5.
Sterling, Alex. T.	Crisfield	Pocomoke Sound	5.
Sterling, Martin L.	Balto. City, Md.	Little Annemessex Riv.	5.
Sterling, Edw. T.	Crisfield	Apes Hole Creek	5.
Sterling, Jerome.	Crisfield	Apes Hole Creek	5.
Sterling, Agnes L.	Crisfield	Little Annemessex Riv.	5.
Stevens, Isaac.	Crisfield	Little Annemessex Riv.	5.
Sterling, W. F.	Crisfield	Little Annemessex Riv.	5.
Sterling, Wm. C.	Crisfield	Apes Hole Creek	5.
Scott, Vida	Mount Vernon	Monie Bay	5.
Scott, Lucy V.	Mount Vernon	Monie Bay	5.
Sterling, J. T.	Crisfield	Pocomoke Sound	5.
Sterling, Roy	Crisfield	Pocomoke Sound	5.
Sterling, Mary F.	Crisfield	Pocomoke Sound	5.
Sterling, Lenore.	Crisfield	Pocomoke Sound	5.
Sterling, Lillie.	Crisfield	Pocomoke Sound	5.
Sterling, Ida	Crisfield	Pocomoke Sound	5.
Sterling, Arthur.	Crisfield	Pocomoke Sound	5.
Somers, Henry.	Inverness	Manokin River	5.
Sterling, Edward.	Crisfield	Pocomoke Sound	5.
Sterling, Adelia.	Crisfield	Pocomoke Sound	5.
Sterling, Ursula.	Crisfield	Pocomoke Sound	5.
Sterling, Wm. T.	Crisfield	Pocomoke Sound	5.
Sterling, Annie R.	Crisfield	Pocomoke Sound	5.
Sterling, Olive.	Crisfield	Pocomoke Sound	5.
Sterling, Robt. G.	Crisfield	Pocomoke Sound	5.
Sterling, C. C.	Crisfield	Pocomoke Sound	5.
Somers, Wm. J.	Champ	Manokin River	5.
Somers, G. A.	Champ	Manokin River	5.
Somers, E. W.	Champ	Manokin River	5.
Somers, C. N.	Champ	Manokin River	5.
Sterling, Cornelius.	Crisfield	Little Annemessex Riv.	5.
Sterling, John.	Crisfield	Little Annemessex Riv.	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Simpkins, E. R.	Dames Quarter	Monie Bay	5.
Seltzer, Edw. L.	Shelltown	Pocomoke Sound	5.
Stevens, Francis J.	Philadelphia, Pa.	Jones Creek	5.
Simpkins, Chas. M.	Dames Quarter	Monie Bay	5.
Smith, J. W.	Oriole	Manokin River	5.
Smith, Loretta	Oriole	Manokin River	5.
Shockley, Lester	Oriole	Manokin River	5.
Tawes, Hattie E.	Crisfield	Little Annemessex Riv.	5.
Tawes, John W.	Crisfield	Little Annemessex Riv.	5.
Tyler, Emma J.	Tulls Corner	Pocomoke Sound	5.
Tull, Ira R.	Crisfield	Little Annemessex Riv.	5.
Tawes, Almira E.	Crisfield	Jenkins Creek	5.
Tawes, Hance E.	Crisfield	Jenkins Creek	5.
Tawes, Geo. W.	Crisfield	Jenkins Creek	5.
Tawes, Lillie M.	Crisfield	Jenkins Creek	5.
Tull, E. W.	Marion Station	Annemessex River	5.
Tull, Carrie E.	Marion Station	Annemessex River	5.
Tyler, Geo	Crisfield	Little Annemessex Riv.	5.
Tull, W. L.	Crisfield	Little Annemessex Riv.	5.
Tull, Robt. J.	Crisfield	Pocomoke Sound	5.
Tawes, Grace	Crisfield	Apes Hole Creek	5.
Tull, S. A.	Crisfield	Pocomoke Sound	5.
Tawes, Addie B.	Crisfield	Pocomoke Sound	5.
Tull, A. E.	Crisfield	Pocomoke Sound	5.
Tawes, Isaac H.	Crisfield	Pocomoke Sound	5.
Tyler, Grace	Crisfield	Little Annemessex Riv.	5.
Tyler, John L.	Crisfield	Little Annemessex Riv.	5.
Wise, Jacob	Crisfield	Somer's Creek	5.
Waters, Stephen G.	Upper Fairmount	Manokin River	5.
Woodland, Lydia	Crisfield	Little Annemessex Riv.	5.
Wharton, Sallie J.	Crisfield	Little Annemessex Riv.	5.
Ward, Alethea A.	Marion Station	Pocomoke Sound	5.
Ward, Geo. F.	Marion Station	Pocomoke Sound	5.
Wallace, Geo.	Champ	Manokin River	5.
Williams, Benj. F.	Tulls Corner	Pocomoke Sound	5.
Whittington, SallieA.	Marion Station	Pocomoke Sound	5.
Whittington, Aus.	Marion Station	Pocomoke Sound	5.
Whittington, S. F.	Marion Station	Pocomoke Sound	5.
Waters, Edw. J.	(Not given)	Manokin River	5.
Whittington, A. A.	Marion Station	Gunby Creek	5.
Whittington, Carrie A.	Marion Station	Pocomoke Sound	5.
White, H. W.	Dames Quarter	Dames Quarter Creek	5.
Whittington, Mary.	Marion Station	Annemessex River	5.
Wilson, David J.	Emmorton, Har. Co.	Laws Thoroughfare	5.

QUEEN ANNE'S COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Bryan, Jonathan A.	Ford's Store	Eastern Bay	5.
Coulter, Thos. W.	Kent Island	Crab Alley Creek	2.25
Earle, Wm. B.	Centreville	Corsica Neck	5.
Golt, Elmer	Kent Island	Crab Alley Creek	2.88
Greaves, C. A.	Stevensville	Shipping Creek	4.75
Hopkins, Chas. W.	Centreville	Cox's Creek	5.
Hopkins, W. H. H.	(Not given)	Cox's Creek	5.
Hoxter, M. E. Mrs.	Stevensville	Shipping Creek	5.
Jones, Benj. F.	Kent Island	Crab Alley Creek	2.5
Johnson, Wm. E.	Kent Island	Crab Alley Creek	5.
Lowery, A. C.	Kent Island	Crab Alley Creek	5.
Marvel, Jas. W.	Stevensville	Shipping Creek	2.75
Palmer, W. L.	Chester	Crab Alley Creek	5.
Tull, Geo. T.	Kent Island	Crab Alley Creek	4.
Tull, Thos. H.	Kent Island	Crab Alley Creek	3.

KENT COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Brown, S. R. Miss.	Baltimore, Md.	Warren Cove	4.9
Emory, R. S.	Chestertown	Chester River	3.
Hinson, R. D.	Chestertown	Hale Creek	5.
Stevens, R. N.	Baltimore, Md.	Hunting Field Creek	5.

ST. MARY'S COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Abell, Geo. F.	Leonardtown	Town Creek	5.
Abell, Geo. C.	Leonardtown	Patuxent River	3.
Adams, Benj. F.	Leonardtown	Britton's Bay	3.2
Bailey, Mat. R.	River Springs	St. Catherine's Bay	5.
Briscoe, Wm. W.	Valley Lee	St. Mary's River	4.07
Bailey, Jas. F.	River Springs	St. Margaret's Bay	5.5
Brown, Jas. E.	Leonardtown	Patuxent River	1.6
Brown, Edward V.	Drayden	St. George's River	1.
Burch, Jno. C.	Leonardtown	Britton's Bay	5.
Broome, J. Thomas.	St. Mary's City	St. Mary's River	3.5
Burch, Ernest D.	Milestown	Canoe Creek	1.
Brill, Mrs. M. M. E.	Park Hall	St. Mary's River	4.6
Burch, Mary Q.	Oakley	Canoe Creek	1.
Burch, Ann R.	Oakley	Canoe Creek	1.
Buhrman, Henry J.	Porto Bello	St. Mary's River	3.
Burch, Jas. H.	Oakley	Canoe Creek	3.75
Bailey, James T.	Leonardtown	St. Catherine's Bay	3.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Bullock, Jas. H.	Leonardtown	Britton's Bay	1.5
Chesser, Tyler D.	Drayden	St. George's River	4.
Chesser, W. W.	Drayden	St. George's River	1.
Cox, Joseph	Valley Lee	St. Mary's River	2.
Clarke, R. K. & Son.	Hollywood	Clarke's Creek	10.
Cheseldine, A. F.	River Springs	St. Catherine's Bay	5.
Coad, J. Edwin	Drayden	St. Mary's River	5.
Duke, John F.	Leonardtown	Britton's Bay	4.4
Davis, Louis C.	Leonardtown	Patuxent River	2.5
Dunbar, Fred. W.	Ridge	Smith's Creek	3.75
Dunbar, Wm. M.	Ridge	Smith's Creek	3.25
Dent, J. Marshall.	Oakley	Canoe Creek	1.
Dean, John C.	Leonardtown	Patuxent River	3.5
Edwards, Geo. D.	Drayden	St. Mary's River	2.
Ewell, Harrison.	Leonardtown	Britton's Bay	5.
Farr, Joseph J.	Chaptico	Wicomico River	7.
Fenwick, Theodore.	St. Inigoes	St. Mary's River	3.8
Forestell, J. T.	Wynne	Smith's Creek	5.
Fenwick, John H.	St. Mary's City	(Not given)	5.
Greenwell, C. B.	Leonardtown	Britton's Bay	3.
Gibson, Joseph E.	Abell	Canoe Creek	3.25
Greenwell, J. Philip.	Leonardtown	St. Clements Bay	10.
Hyatt, Alpheus	Porto Bello	St. Mary's River	5.
Hebb, John S.	2301 Boston St., Baltimore, Md.	Carthagena Creek	4.
Johnson, L. B.	Morganza	Britton's Bay	5.
Joy, H. H.	Leonardtown	Patuxent River	1.
Knott, Wm. H.	Rock Hall	St. Mary's River	1.8
Kennedy, Alex.	St. Mary's City	St. Mary's River	5.
Lee, Jas. Fenner.	California	Patuxent River	5.
Morris, Lydia A.	St. Inigoes	Smith's Creek	5.
Mattingly, Jas. M.	Leonardtown	Britton's Bay	5.
Milburn, N. P.	Leonardtown	St. Mary's River	4.74
Marmaduke, Alex.	Drayden	St. George's River	1.
McCoy, Wm. R.	Baltimore, Md.	St. Mary's River	5.
Norris, J. Jetson.	Leonardtown	Patuxent River	4.
Norris, J. Walter.	Leonardtown	Patuxent River	4.
Owens, Francis J.	Leonardtown	3rd Election District	1.
Ripple, E. N.	Leonardtown	Patuxent River	5.
Russell, J. Solomon.	Leonardtown	Wicomico River	4.5
Sheehan, John F.	Drayden	St. Mary's River	2.
Shorter, Chas. E.	Drayden	St. Mary's River	2.3
Shorter, Wm. C.	Drayden	St. Mary's River	1.1
Smith, Capt. J. W.	Leonardtown	Cuckholds Creek	1.1
Smith, Jas. F.	Porto Bello	St. Mary's River	2.2

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Smith, H. J.	Leonardtown	Patuxent River	4.5
Swann, J. Thos.	Piney Point	St. George's River	1.
Shade, Wm. H.	Park Hall	St. George's River	4.1
Shade, Edwin	Park Hall	St. George's River	4.1
Taylor, Jesse	Valley Lee	St. Mary's River	.7
Turner, John H., Jr.	Compton	Britton's Bay	3.
Williar, Harry D.	Baltimore, Md.	St. Mary's River	5.
Wise, Jackson	Leonardtown	Britton's Bay	1.9
Wise, Samuel O.	Leonardtown	Britton's Bay	5.
Williams, Lawrence.	Wynne	Potomac River	4.3
Woods, Chas. D.	Wynne	Smith Creek	2.
Yates, Colton	Leonardtown	Britton's Bay	1.

TALBOT COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Anderson, C. H.	Easton	Goldsborough Creek	5.
Bringman, Herman.	Oxford	Goldsborough Creek	5.
Burrows, Mary E.	Royal Oak	Oak Creek	1.
Bratt, Samuel W.	Easton	Tread Avon River	3.6
Baynard, G. Oscar.	St. Michaels	Miles River	5.
Bielefeldt, Wm. J.	St. Michaels	Miles River	5.
Biedelfeldt, Bertha.	St. Michaels	Miles River	5.
Cockey, John	Claiborne	Tilghman's Creek	5.
Collison, J. A.	Easton	Irish Creek	4.
Collins, Mrs. S. W.	Oxford	Goldsborough Creek	4.8
Collins, H. E.	Oxford	Goldsborough Creek	4.
Callahan, Geo. E.	Easton	Leeds Creek	1.
Clough, Robt. H.	Royal Oak	Tread Avon River	5.
Cross, A. E.	Baltimore, Md.	Harris Creek	1.1
Dawson, L. G.	Oxford	Town Creek	5.
Dorrance, Nellie.	Washington, D. C.	Miles River	4.3
Dorrance, J. M.	Washington, D. C.	Miles River	5.
Dorrance, A. K.	Washington, D. C.	Miles River	5.
Dean, Melvin	Oxford	Tread Avon River	5.
Earle, Oscar T.	St. Michaels	Hunting Creek	5.
Easter, Mrs. M. W.	Royal Oak	Plaindealing Creek	2.2
Frampton, C. L.	Royal Oak	Fox Hole Creek	5.
Fairbank, Chas. E.	Easton	Tread Avon River	5.
Griffith, Mrs. Chas. F.	Tunis Mills	Leeds Creek	1.
Goldsborough, I. B.	New York City	Goldsborough's Creek	5.
Goldsborough, M. T., Jr.	Easton	Goldsborough's Creek	5.
Goldsborough, M. T., Sr.	Easton	Goldsborough's Creek	5.
Glasscock, A. B.	St. Michaels	Goldsborough's Creek	5.
Glasscock, A. L.	St. Michaels	Goldsborough's Creek	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Gibson, M. K.	Easton	Broad Creek	3.
Holden, E. T.	Easton	Goldsborough's Creek	5.
Harrison, J. B.	Tilghman	Poplar Island Harbor	5.
Harrison, Mrs. J. B.	Tilghman	Poplar Island Harbor	5.
Hall, A. R. D. Mrs.	Easton	Miles River	5.
Harrison, A. J.	Tilghman	Poplar Island Narrows.	4.8
Haddaway, A.	Claiborne	Tilghman's Island	5.
Harrison, J. W.	Easton	Choptank River.	5.
Howeth, Charlotte.	Tilghman	Poplar Island Narrows.	5.
Howeth, Chas. J.	Tilghman	Poplar Island Narrows.	5.
Harrison, C. H. H.	Valliant	Poplar Island Narrows.	5.
Henderson, C. E., Jr.	Easton	Miles River	3.3
Henderson, I. M.	Easton	Miles River	3.3
Henderson, C. E., Sr.	Easton	Miles River	3.6
Hall, Wm. P.	Easton	Miles River	5.
Jump, Jno. B.	Easton	Bay Hundred District	5.
Leonard, D. B.	Royal Oak	Fox Hole Creek	5.
Longfield, L F.	Oxford	Lewis' Cove	5.
Matthews, A. H.	Oxford	Oxford Neck	5.
Moore, Jos. of G.	Easton	Plaindealing Creek	1.2
Moore, Wm. G.	Easton	Plaindealing Creek	1.2
Mister, A. T.	Tilghman	Dunn's Cove	5.
Mann, Harry E.	Baltimore, Md.	Bay Hundred District	4.
Martin, Francis.	Easton	Double Mills	2.75
McConnell, S. D.	Easton	Miles River	5.
McConnell, Annie B.	Easton	Miles River	5.
Pastorfield, Wm. F.	Royal Oak	Fox Hole Creek	5.
Parsons, Edw. F.	Easton	Goldsborough Creek	2.4
Price, Paul.	St. Michaels	Broad Creek	1.7
Pepper, P.	Bellevue	Tar Creek	1.1
Plummer, Matth. T.	Oxford	Island Creek	2.25
Rice, Margaret L.	Baltimore, Md.	Tread Avon River	5.
Rivers, Janet B.	Baltimore, Md.	Harris Creek	5.
Rivers, Arthur D.	Baltimore, Md.	Harris Creek	5.
Rollins, Thornton.	Baltimore, Md.	Plaindealing Creek	10.
Rivers, L. Lucas.	Baltimore, Md.	Harris Creek	5.
Sinclair, Elmer N.	Tilghman's Island	Harris River	4.2
Stevenson, Henry W.	Oxford	Island Creek	2.8
Seth, Mary W.	Easton	Tilghman's Creek	5.
Seymour, S. O.	St. Michaels	Broad Creek	3.13
Smith, Wm. I.	Easton	Town Creek	5.
Valliant, Rev. J. F.	Valliant	Cobbler's Neck	5.
Valliant, L. N.	Valliant	Cobbler's Neck	5.
Valliant, M. J.	Valliant	Cobbler's Neck	5.
Valliant, B. E.	Bellevue	Tread Avon River	2.7

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Valliant, Hugh B...	Valliant	Eastern Bay.....	5.
Valliant, Annetta...	Bellevue	Tread Avon River.....	5.
Valliant, Jeremiah..	Oxford	Town Creek.....	3.18
West, Mary L.....	Easton	Goldsborough Creek...	5.
Wingard, Geo. M....	Oxford	Goldsborough Creek...	4.35
Wingard, Mary H...	Oxford	Goldsborough Creek....	4.55
Wingard, Sallie.....	Oxford	Island Creek Cove.....	3.5
Wilson, A. J.....	Easton	Bay Hunter District...	5.
Warfield, Frank:....	Tampa, Fla.....	Fox Hole Creek.....	5.

WICOMICO COUNTY.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Adkins, F. P.....	Salisbury	Nanticoke River.....	5.
Adkins, E. S.....	Salisbury	Nanticoke River.....	5.
Bradshaw, Thos. A..	Salisbury	Wicomico River.....	5.
Brady, Nettie.....	Salisbury	Ellis Bay.....	5.
Bradshaw, Geo. B...	Salisbury	Wicomico River.....	5.
Bailey, J. C.....	Salisbury	Ellis Bay	5.
Bloodsworth, J. R...	Salisbury	Wicomico River.....	3.5
Bloodsworth, J. F...	Salisbury	Wicomico River.....	5.
Brady, Ella.....	Salisbury	Wicomico River.....	5.
Brady, Lilly.....	Salisbury	Ellis Bay.....	5.
Bloodsworth, W. S..	Salisbury	Wicomico River.....	5.
Brady, Will C.....	Salisbury	Ellis Bay.....	5.
Collins, Lambertine.	Salisbury	Wicomico River.....	5.
Catlin, Elmer H....	Salisbury	Wicomico River.....	5.
Catlin, Alex. W.....	Salisbury	Wicomico River.....	5.
Covington, Jas. K...	Tyaskin	Wetipquin	2.13
Dickerson, Sam'l G..	Jesterville	Nanticoke River.....	5.
Evans, Emma V....	Salisbury	Ellis Bay.....	5.
Evans, Robert G....	Salisbury	Wicomico River.....	5.
Hopkins, Edgar P...	(Not given).....	Wicomico River.....	5.
Hopkins, George W.	(Not given).....	Wicomico River.....	5.
Hopkins, Geo. J. C..	Jesterville	Wicomico River.....	5.
Heath, Julia A. C...	Jesterville	Nanticoke River.....	5.
Heath, E. J.....	Jesterville	Nanticoke River.....	5.
Heath,W. H. and S. E.	Jesterville	Nanticoke River.....	5.
Hopkins, John T....	Victor	Wicomico River.....	5.
Insley, Jno. W.....	(Not given).....	Nanticoke River.....	5.
Insley, John H.....	(Not given).....	Nanticoke River.....	5.
Insley, Levin T.....	(Not given).....	Nanticoke River.....	4.7
Insley, George D....	(Not given).....	Nanticoke River.....	5.
Leatherbury, R. Lee.	(Not given).....	Wicomico River.....	5.
Leatherbury, Lettie..	(Not given).....	Wicomico River.....	5.

Name of Applicant.	Postoffice Address.	Location of Lot.	No. of Acres.
Leatherbury, L. H.	(Not given)	Ellis Bay	5.
Leatherbury, Chas.	(Not given)	Ellis Bay	5.
Leatherbury, W. K.	(Not given)	Wicomico River	5.
Leatherbury, Nellie.	(Not given)	Wicomico River	5.
Larrimore, George.	Tyaskin	Nanticoke River	5.
Moore, George.	Tyaskin	Wicomico River	5.
Preston, Thomas.	Tyaskin	Wicomico River	5.
Roberts, Harry.	Jesterville	Nanticoke River	5.
Robertson, Mack.	(Not given)	Nanticoke River	4.38
Robertson, Harry C.	Salisbury	Nanticoke River	5.
Robertson, Geo. B.	White Haven	Ellis Bay	5.
Sims, Revell P.	(Not given)	Wicomico River	5.
Sims, Emma.	(Not given)	Wicomico River	5.
Toadvine, Adah L.	(Not given)	Wicomico River	5.
Toadvine, Lee.	(Not given)	Wicomico River	5.
Toadvine, Ruby F.	(Not given)	Wicomico River	5.
Toadvine, Stella H.	(Not given)	Wicomico River	5.
Toadvine, Lida H.	(Not given)	Wicomico River	5.
Toadvine, L. C.	Nanticoke	Nanticoke River	5.
Turner, Alice P.	Nanticoke	Nanticoke River	3.
Wingate, John W.	(Not given)	Wicomico River	5.
Williams, Jay.	(Not given)	Wicomico River	5.
Williams, Alonza L.	(Not given)	Wicomico River	5.
Williams, Chas. E.	Salisbury	Nanticoke River	5.
White, I. H.	Salisbury	Nanticoke River	5.
Williams, Elmer C.	Salisbury	Nanticoke River	5.
White, Matilda T.	White Haven	Wicomico River	5.
White, Samuel E.	White Haven	Wicomico River	4.
Wainwright, E. H.	Clara	Ellis Bay	5.
White, James A.	Salisbury	Nanticoke River	5.
White, Samuel M.	Salisbury	Nanticoke River	5.
Willing, Geo. W. W.	Salisbury	Nanticoke River	5.
Williams, Alb't H.	Nanticoke	Nanticoke River	5.
Willing, Franklin A.	(Not given)	Nanticoke River	5.
Williams, Thos. H.	Salisbury	Nanticoke River	5.
Williams, L. E.	Salisbury	Nanticoke River	5.

NUMBER OF APPLICATIONS RECEIVED FOR RETENTION OF OYSTER LOTS, HELD UNDER FORMER LAW, AND TOTAL NUMBER OF ACRES APPLIED FOR.

Anne Arundel County	29	applications for	118.94	acres.
Calvert	"	92	"	"	325.70	"
Charles	"	23	"	"	106.65	"
Dorchester	"	161	"	"	766.21	"
Kent	"	4	"	"	17.90	"
Somerset	"	315	"	"	1,559.13	"
St. Mary's	"	73	"	"	255.51	"
Talbot	"	83	"	"	344.91	"
Wicomico	"	69	"	"	331.63	"
Total		849	"	"	3,826.59	"

LESSEES OF OYSTER GROUNDS.

Alphabetical List, by Counties, of Lessees of Oyster Ground, Under the Provisions of Chapter 711, of the Acts of 1906, Giving Number of Acres Leased, September 30, 1907.

ANNE ARUNDEL COUNTY.

Lessee.	No. of Acres.	Lessee.	No. of Acres.
Collins, Severn A.	3.25	Larson, Charles.	3.25
Davis, George A.	2.5	Lerch, F. T.	5.
Dawson, J. W.	4.75	Martin, Charles E.	5.
Duvall, Charles Milton.	4.75	Martin, John W.	5.
Hartge, Edmund L.	2.95	Murray, Mary H.	5.
*Hopkins, O. B.	.10	Nowell, William G.	2.5
Keidel, Henry.	5.	Sanders, William H.	5.
Keidel, Adelia L.	3.	Worthington, Joseph M.	5.

CALVERT COUNTY.

Lessee.	No. of Acres.	Lessee.	No. of Acres.
Breeden, George L.	5.	Hance, Young D.	5.
Breeden, John W.	5.	Jones, John M.	1.31
Breeden, Jake E.	3.	Joy, John B.	2.75
Bowen, Wise.	5.	Ketcham, M. A.	5.
Breeden, William E.	5.	Ketcham, Asa C.	5.
Breeden, John E.	4.	Kopp, John C.	5.
Bowen, Helen V. M.	5.	Lore, Joseph C.	2.5
Bowen, Isaac P.	5.	Mister, John R.	1.88
Brome, N. W.	5.	Overton, Chas. S.	5.
Brome, M. R.	5.	Overton, Daisy M.	4.37
Blackburn, William C.	5.	Overton, S. P.	5.
Breeden, Barbara E.	5.	Overton, W. E.	5.
Breeden, Laura V.	3.5	Railey, John.	2.46
Barrett, Daniel.	5.	Sullivan, P. J.	3.25
Barrett, Christian.	5.	Seipp, William A.	4.75
Dodson, William I.	1.9	Tongue, T. O.	5.
Glover, John W.	2.85	Turner, George D.	5.
Glover R. M.	3.2	Tongue, Frank.	2.8
Gantt, William Warren.	1.25	Tongue, Frances Howard.	1.75
Gantt, John B.	2.	Weems, Clarence.	4.75

*Applicant under new law for new area. Did not apply under provisions of Sec. 108, Ch. 711 of the Acts of 1906.

CHARLES COUNTY.

Lessee.	No. of Acres.
Alvey, William C.	5.
Cullison, Geo.	3.
Henderson, Alethea H.	5.
Jackson, John C.	5.
Jackson, Walter L.	5.
Lancaster, S. S.	5.
Norris, James N.	3.65
Thomas, James E.	5.

DORCHESTER COUNTY.

Lessee.	No. of Acres.
Bonds, Maria L.	1.33
Booze, Robert G.	5.
Brannock, Annie L.	2.15
Brannock, Edgar.	4.05
Barton, J. Frederick.	5.
Bloodsworth, R. E.	5.
Clayton, John M.	5.
Collier, Effie M.	5.
Dashiell, Edwin, Jr.	5.
Elliott, William E.	5.
Ewell, William T.	5.
Foxwell, William M.	5.
Gray, James W.	5.
Gray, Martha.	5.
Gray, Bessie.	3.75
Gray, John W.	5.
Gray, Cornelius.	5.
Gray, Clara E.	5.
Hurley, Elijah.	5.
Hayward, Eliza E.	.9
Hurley, Celia E.	5.
Hurley, Levin.	5.
Horseman, Charles W.	5.
Jones, James W.	5.
Jones, Harvey.	5.
Jackson, Thomas J.	5.
Kenley, Mary A.	5.
Kinnamon, Wilton T.	5.
Lewis, Thomas.	5.
Moore, Alonza M.	5.
Moore, Alberry H.	5.
Moore, Mary J.	2.25
Moore, Pheby.	1.88
Moore, Herman W.	5.
Moore, Delma A.	2.5
Muse, William S.	5.
Mace, John.	5.
Mitchell, R. H.	5.
Phillips, Luther.	5.
Robinson, William T.	5.
Rippon, Thomas L.	5.
Robinson, S.	5.
Simmons, Maggie L.	5,
Simmons, Samuel M.	5.
Simmons, Dorinda H.	5.
Shepherd, James S.	5.
Tyler, Kate.	5.
Tyler, Stella.	5.
Travers, John E.	5.
Tyler, W. B.	5.
Tyler, James F.	5.
Tyler, Samuel M.	5.
Travers, Levin F.	5.
Turner, Oscar A.	5.
Turner, Llewella E.	5.
Vickers, Thomas H.	5.
Wingate, Christopher C.	5.
Willey, Sallie.	5.
Wilson, Thomas S.	5.

TALBOT COUNTY.

Lessee.	No. of Acres.
Anderson, C. H.	5.
Bringman, Herman.	5.
Baynard, G. Oscar.	5.
Burrows, Mary E.	1.
Cross, A. E.	1.63
Collins, Mrs. S. W.	4.81

Lessee.	No. of Acres.
Collins, Herbert E.	4.88
Dean, Melvin	5.
Frampton, Chas. L.	5.
Easter, Mrs. M. W.	2.18
Glascock, Arthur D.	5.
Glascock, Anna L.	5.
Howeth, Charlotte E.	5.
Howeth, Charles J.	5.
Henderson, Charles E.	3.37
Henderson, Charles E., Jr.	3.20
Henderson, Ida M.	3.25
Haddaway, Alexander	1.46
Harrison, Charles H. H.	5.
McConnell, S. D.	5.
McConnell, Anna B.	5.
Martin, Frances S.	2.81
Mister, Albert T.	5.
*Mann, Harry E.	4.67
Peppler, P.	1.48
Plummer, Matthew T.	2.25
Pastorfield	5.
Rollins, Thornton	2.59
Rivers, Arthur D.	5.
Rivers, Janet B.	5.
Rivers, L. Lucas	5.
*Seth, Mary W.	5.
Sinclair, Elmer N.	4.16
Smith, W. I., Sr.	5.
Valliant, Bessie E.	2.63
Valliant, Hugh B.	5.
Valliant, Annetta	5.

PRINCE GEORGE'S COUNTY.

Lessee.	No. of Acres.
Stevens, R. Nelson	5.

QUEEN ANNE'S COUNTY.

Lessee.	No. of Acres.
Hoxter, Mary E.	5.
Tull, Thomas H.	3.
Tull, George T.	4.

SOMERSET COUNTY.

Lessee.	No. of Acres.
Adams, W. J.	5.
Blades, T. C.	5.
Baker, Louise T.	5.
Beauchamp, Vaughn	5.
Bradshaw, Jacob T.	5.
Beauchamp, William T.	5.
Bennett, Charles O.	5.
Bennett, Garnett E.	5.
Bennett, E. S.	5.
Bennett, Ida G.	5.
Bennett, Fred L.	5.
Bennett, G. W.	5.
Bennett, W. F.	5.
Byrd, Ruby E.	5.
Byrd, William E.	5.
Byrd, Elizabeth E.	5.
Croswell, Julia A.	5.
Cox, Effie K.	5.
Conner, M. S.	5.
Cox, George A.	5.
Conner, N. T.	5.
Coulbourn, Joseph E.	5.
Conner, Eliza J.	5.
Coulbourn, John W.	5.
Clayton, Sarah A.	5.
Coulbourn, Annie M.	5.
Chelton, Wm. H.	5.
Coulbourn, W. Clark	5.
Coulbourn, Lena V.	5.
Coulbourn, Lottie	5.

*Transferred to Henry H. Pearsons, of Talbot County.

Lessee.	No. of Acres.
Coulbourn, Julia	5.
Dayton, Cora	5.
Dayton, Millard F	5.
Daugherty, Elijah T	5.
Dorman, Geo. E	5.
Evans, William W	5.
Evans, Maggie S	5.
Ford, Herschel	5.
Fisher, William	5.
Gillis, Joshua	5.
Gillis, Sarah A	5.
Gibson, Benjamin F	5.
Gibson, William E	5.
Gray, James M	5.
Hall, W. C	5.
Hall, I. Henry	5.
Henderson, Mary E	5.
Jones, Robert H	5.
Johnson, John S	5.
Landon, Virginia	5.
Long, Aurelius A	5.
Landon, Walter G	5.
Landon, William R	5.
La Vallette, Amy	5.
Lawson, E. S	5.
Muir, William L	5.
Mister, Lawson	5.
Miles, Edwin E	5.
Miles, Southey F	5.
Matthews, Charles L	5.
McDaniel, Mathias J	5.
Nelson, E. W	5.
Purnell, Isaac J	5.
Pruitt, John E	5.
Peyton, Eva B	5.
Peyton, Orrie F	5.
Riggin, Horace	4.21
Riggin, Elisha T	4.81
Robertson, Samuel H., Jr	5.
Riggin, Charles E	5.
Sterling, William C	5.
Scott, Vida A	5.
Scott, Lucy V	5.
Somers, Henry	5.
Sterling, Ida	5.
Sterling, Adelia	5.
Sterling, Lillie	5.
Sterling, Arthur	5.
Sterling, Roy	5.
Sterling, Lenore	5.
Sterling, I. Tubman	5.
Sterling, John	5.
Sterling, Cornelius	5.
Sterling, Martin L	5.
Somers, E. W	5.
Somers, G. A	5.
Somers, William J	5.
Somers, C. N	5.
Smith, Loretta	5.
Shockley, Leslie	5.
Smith, John W	5.
Sterling, Mary F	5.
Tawes, Grace	5.
Tull, Washington L	5.
Tull, Carrie E	5.
Taylor, Emma I	5.
Tull, E. W	5.
Tyler, George	5.
Tawes, Isaac H	5.
Tull, Ira R	3.75
Tull, R. J., Jr	5.
Tyler, Grace	5.
Tawes, Addie B	5.
Williams, Benjamin F	5.
Waters, Edward J	5.
Ward, Alethea A	5.
Whittington, Carrie	5.
Ward, George F	5.
Whittington, A. A	5.
Whittington, Mary	5.
Whittington, S. F	5.

ST. MARY'S COUNTY.

Lessee.	No. of Acres.
Abell, George F	5.
Burch, James H	3.75
Buhrman, Henry J	3.
Clark, R. King	5.

Lessee.	No. of Acres.
Cheseldine, A. Freeman	4.75
Coad, J. Edwin	5.
Dunbar, William W	3.25
Dunbar, Fred V	3.75
Dean, John C	3.5
Ewell, Harrison	5.
Forestell, John T	5.
*Farr, Joseph J	7.
Gibson, Joseph E	3.25
Hyatt, Alpheus	5.
†Hebb, John S	4.
Johnson, Leonard B	5.
Morris, Lydia A	4.98
Kennedy, Alexander	5.
Shorter, Charles E	2.33
Swann, J. Thomas	1.
Smith, Umphrey	4.2
Smith, J. Winfield	1.6
Smith, James F	2.4
Taylor, Jessie	.7
Wise, Samuel O	5.
Wood, Charles D	2.
Williar, Harry D	4.75
Yates, Colton	1.

WICOMICO COUNTY.

Lessee.	No. of Acres.
Collins, Lambertine	5.
Hopkins, John T	5.
Hopkins, George W	5.
Hopkins, George J. C	5.
Leatherbury, W. K	5.
Robertson, Harry C	5.
Turner, Alice P	3.
White, S. M	5.

NUMBER‡ OF LEASES GRANTED TO OYSTER LOTS HELD UNDER FORMER LAW AND TOTAL NUMBER OF ACRES LEASED.

Anne Arundel County	16	leases	covering	71.95	acres.
Calvert	"	40	"	"	159.27	"
Charles	"	8	"	"	36.65	"
Dorchester	"	59	"	"	276.81	"
Somerset	"	111	"	"	537.77	"
Prince George's**	"	1	"	"	5.00	"
Queen Anne's‡‡	"	3	"	"	12.00	"
St. Mary's	"	28	"	"	101.71	"
Talbot	"	37	"	"	151.37	"
Wicomico	"	8	"	"	38.00	"

*Held jointly with Stephen L. Graves.

†Transferred to Edwin H. Ford, of Baltimore City.

‡The figures given in this table represent the number of leases granted and recorded on September 30, 1907. Their lack of agreement with those on page 76 is due to the fact that many lotholders who had filed informal application only for their lots (see page 76) availed themselves of their opportunity to complete applications during the survey of their respective counties and to have their lots resurveyed prior to taking out leases.

**Included with applications from Charles County.

‡‡Included with applications from Talbot County.

The barren area of Anne Arundel County was opened for leasing purposes on April 2d, 1907.

Section 100, of Ch. 711, provides in part that, for a period of four months after the said survey shall have been completed, or after any area shall have been opened for leasing, citizens of Maryland, residing in any part of the State, who, at the time of the completion of said survey, or at the respective times of the opening for oyster culture of several areas, as the case may be, may be owners of land having a water front upon any part of the said areas so opened to oyster culture, shall have the exclusive right to rent any land opened to oyster planting under the provisions of this Act, adjacent to their lands.

Under this portion of Section 100, the following applications were received:

Applicant.	No. of Acres.	Location of Oyster Lot.
Henry E. Waggaman.....	10	South River.
George T. Melvin.....	10	Church Creek.
William Wilde.....	3	West River.
Matilda C. Pitcher.....	10	South River.
Oswald B. Hopkins.....	10	Herring Bay.
Lester L. Stevens.....	10	Magothy River.
Theodore W. Forbes.....	10	Herring Bay.
Thomas Tydings.....	10	Cherry Tree Neck.
William G. Nowell.....	40	Chesapeake Bay.
Benjamin Garner.....	10	Aberdeen Creek.
John R. Sheckell.....	5	South River.
Maggie A. Friemel.....	10	Severn River.
Charles A. Friemel.....	4	Severn River.
Alice A. Bates.....	5	Severn River.
Elizabeth Giddings.....	10	Severn River.
Henry M. Fitzhugh.....	10	Severn River.
Mary A. Fitzhugh.....	10	Severn River.

HYDROGRAPHY.[29]

INFORMATION FURNISHED.

Before beginning the actual survey of the oyster grounds the Commission was furnished by the United States Coast and Geodetic Survey with projections, constructed on a scale of 1 part in 5,000 (approximately 6 1-3 inches to a statute mile), showing the coast line of the localities to be surveyed and the plotted positions of the triangulation stations. The Coast and Geodetic Survey also placed a party in the field to erect such triangulation stations as were needed by the hydrographic engineers for use in making the survey of the oyster grounds.[30]

Under this heading, mention may be made of the service rendered by the United States Bureau of Fisheries, an assistant from that Bureau, Dr. H. F. Moore, having been detailed to consult with the Commission and the hydrographic engineer concerning the methods to be adopted and used for surveying and examining the oyster grounds.

Prior to making a survey of any section the local assistant, appointed by the County Commissioners, informed the hydrographic engineer of the approximate location and extent of the oyster grounds of the section so they could be indicated in pencil on the boat sheets. This information greatly expedited survey operations in that it made surveys of barren bottoms unnecessary.

EQUIPMENT.

The equipment for conducting the survey of the oyster grounds and crabbing bottoms consists in boats and instruments.

---

[29]The chapters on HYDROGRAPHY and STATE BUOYS have been abstracted from the report of the Chief Engineer to the Commission.

[30]Previous to the time the field work of the Coast and Geodetic Survey party began, October 10th, 1906, a number of signals were erected over the old Coast and Geodetic Survey triangulation stations by the hydrographic engineers of the Commission and at other times also it has been necessary for the Commission to assist with this work.

Boats.

The launch "CANVASBACK."[31] with a coxswain and engineer, has been furnished by the United States Bureau of Fisheries. This launch, 42 feet long, 9 foot beam, has a draft of three feet and is hence well adapted for work on oyster grounds the boundaries of which extend into water as shallow as four feet.

The "ANGLE,"[31] a dead-rise bateau, 24 feet in length, belonging to the Commission, has been used for surveying grounds too small in extent or situated in water too shallow for the advantageous use of the launch "CANVASBACK."

The Steamer "GOVERNOR R. M. McLANE," belonging to the State Fishery Force and placed at the disposal of the Commission in accordance with Section 97 of the Haman Oyster Culture Law, has been used for surveying oyster grounds situated in the bold waters of the Bay adjacent to Somerset County. The chief uses to which this steamer has been put, however, have been the placing of buoys at the corners of the natural oyster bars; towing the houseboat "OYSTER" from one anchorage to another and for transporting supplies (coal, water and provisions) to the houseboat.

The launch "INVESTIGATOR,"[32] a bay canoe, 34 feet long with 7.5 foot beam, purchased by the Commission and fitted with an eight-horse-power Fairbanks gasoline engine, has been used during the year 1907 for making examinations of oyster grounds and for collecting data and specimens for the physical and biological investigations. During 1906 various boats were hired for this work, but the necessity for increasing the number of examinations of the grounds surveyed was later realized and a launch more perfectly adapted for the work was therefore fitted up.[33]

A scow, the "MARYLAND," 32 feet long and 12 feet wide, has been built and equipped by the Commission for use in transporting the buoys and sinkers and placing them at the corners

[31]See frontispiece.

[32]See figure 1.

[33]For a detailed account of the work and equipment of the Investigator, see pages 37 and 116.

of the natural oyster bars. The scow is towed from place to place either by the launch "CANVASBACK" or by the steamer "GOVERNOR R. M. McLANE" and the sinkers and buoys are dropped from her deck.

The following description of the houseboat "OYSTER" is copied from the report prepared by Captain C. C. Yates and published by the United States Coast and Geodetic Survey:

HOUSE BOAT "OYSTER."

While arranging to turn over the command of the steamer *Endeavor*, the representative of the Survey, acting under preliminary instructions from the Superintendent, was engaged in frequent consultation with the Shell Fish Commissioners in reference to the programme of future work. In addition to these duties, he undertook for the commissioners the planning and supervision necessary to convert the old side-wheel steamer *Thomas L. Worthley* into a house boat for the surveying parties of both the Commission and the Government. The *Worthley*, now called the house boat *Oyster*, was in excellent condition when purchased by the Commission. The keelsons and timbers were sound and the upper works strong. After the removal of the old engine and boiler, the house boat was docked and her hull thoroughly examined. The outside planking below the water line was found in good condition, and although it was recalked, it was done as an additional precaution, the hull having been absolutely water-tight from the day of purchase.

The *Oyster* is about 135 feet over all and 35 feet in beam. The main deck contains living quarters for 27 men, the officers mess room and the galley. The upper deck has 11 staterooms, 5 for the 3 commissioners and their 2 hydrographic engineers, 4 for the Coast Survey officers, 1 for the representative of the U. S. Bureau of Fisheries, and 1 for the local county oyster commissioner. Besides these rooms, there are located on this deck a large drafting room, a laboratory for oyster investigations, and an office room. Coal for the two Government launches and the galley is stored in the hold, which also contains fresh-water tanks having a capacity of about 7,000 gallons, Signal lumber is carried on the main deck aft of the officers' mess room.

As a whole, the *Oyster* is plainly and practically equipped for the work to be done. She has added much to the amount of the surveying accomplished during the season, and the Coast and Geodetic Survey representative greatly appreciates the practical advantages furnished to his party by their quarters on the house boat. When the large party of the combined surveying forces is taken into consideration with the limited accommodations usually obtainable on shore, the attending

FIGURE 3.
THE HOUSEBOAT "OYSTER."

difficulties of a scattered party, the uncertain location and supply of coal and water for launches and sufficient lumber for signals, it is easily seen that the amount of work accomplished would have been reduced greatly, if there had been no such house boat as the *Oyster* to supply all requirements of the surveying operations.

With reasonable care and repairs, the *Oyster* will be a valuable asset to the Commission at the completion of the oyster survey of the State, besides having paid her first cost several times over in both quality and quantity of work accomplished.

The steam launch "INSPECTOR," although not used by the Commission or its engineers directly, is nevertheless a part of the equipment for the work of the survey. She belongs to and is used by the Coast and Geodetic Survey party in erecting signals, placing monuments to mark the triangulation stations and for making the triangulation necessary to determine the geographical positions of the permanent objects and signals.

A number of small boats, furnished by the United States Coast and Geodetic Survey and Bureau of Fisheries, are available for any purpose for which they may be needed.

Instruments.

The instruments (sextants, protractors and drawing instruments) and record books needed by the hydrographic engineers for conducting the survey of the oyster grounds have been kindly loaned to the Commission by the United States Coast and Geodetic Survey. The uses to which the instruments are put are described further on.

Such instruments as have been found necessary for constructing leasing charts, for computing areas and for conducting the physical and biological investigations* have been purchased by the Commission.

*The apparatus used in ascertaining the density of the water over the oyster grounds is the property of the U. S. Coast and Geodetic Survey. The investigations concerning the oyster food supply of the Chesapeake have been made with a microscope belonging to the Johns Hopkins University.

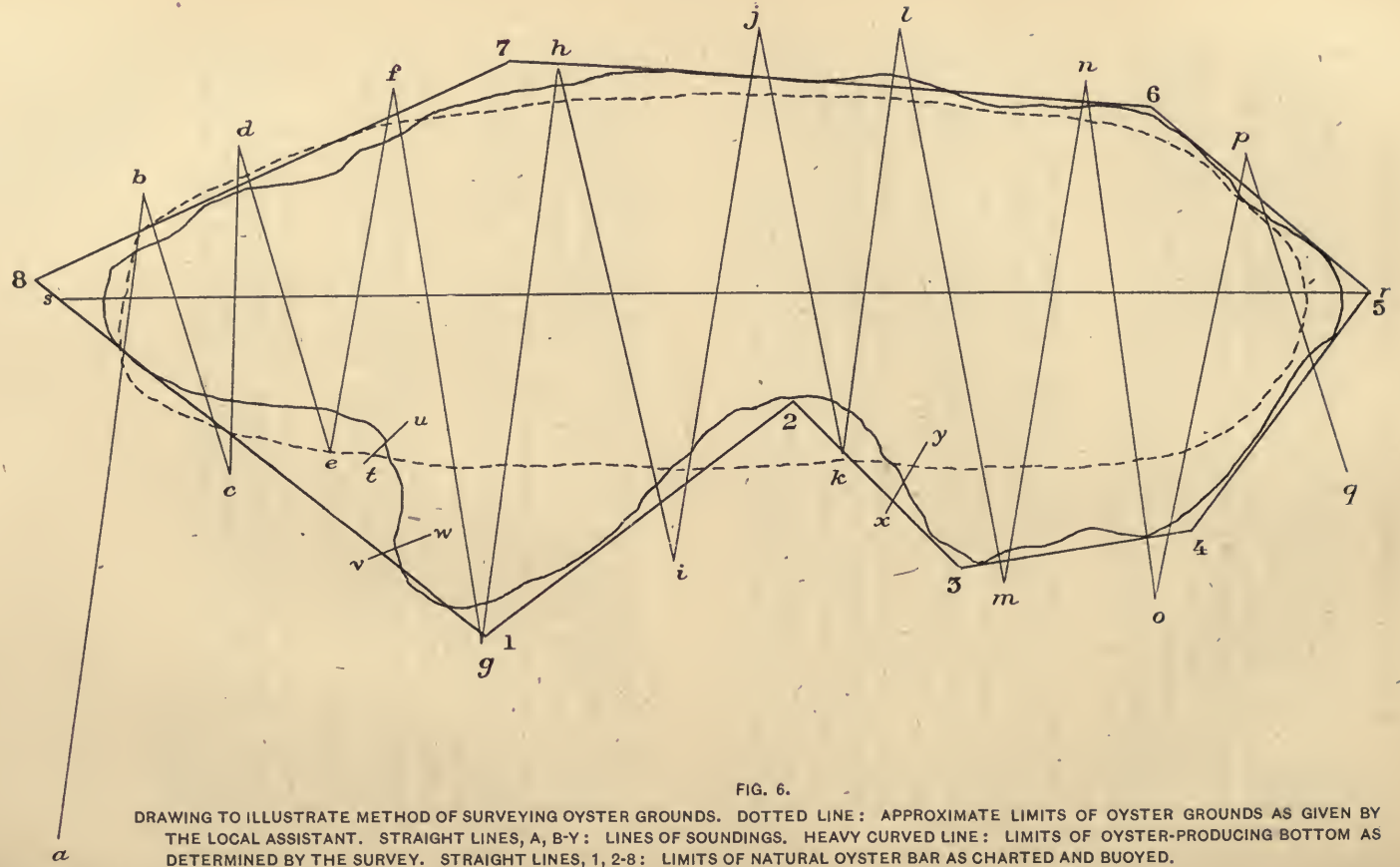


FIG. 6.

DRAWING TO ILLUSTRATE METHOD OF SURVEYING OYSTER GROUNDS. DOTTED LINE: APPROXIMATE LIMITS OF OYSTER GROUNDS AS GIVEN BY THE LOCAL ASSISTANT. STRAIGHT LINES, A, B-Y: LINES OF SOUNDINGS. HEAVY CURVED LINE: LIMITS OF OYSTER-PRODUCING BOTTOM AS DETERMINED BY THE SURVEY. STRAIGHT LINES, 1, 2-8: LIMITS OF NATURAL OYSTER BAR AS CHARTED AND BUOYED.

ORGANIZATION.

The organization of the party for hydrographic field work when fully completed is as follows:[34]

3 Commissioners.
1 Hydrographic Engineer.
3 Asst. Hydrographic Engineers.
1 Clerk (On House boat).
1 Recorder.
1 Leadsman.
1 Local Assistant.
1 Expert Tongman.
1 Carpenter.
1 Painter.
1 Oarsman.
1 Boatswain (House boat).
1 Nightwatchman (House boat).
1 Coxswain (Investigator).
1 Engineer (Investigator).
1 Tide Observer.
2 Cooks.
2 Waiters.

Day laborers for buoy construction and oarsmen have been hired as the exigencies of the work required.

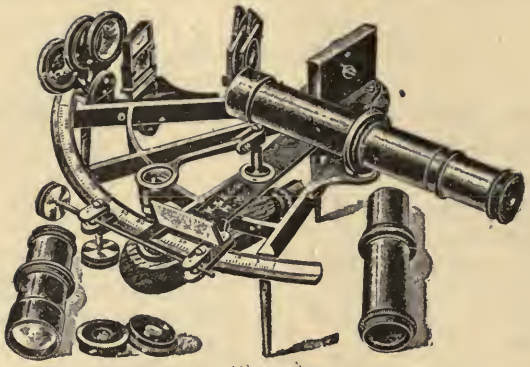
METHODS.

The methods used by the Commission in making the hydrographic survey of the oyster grounds of Maryland, with slight modifications, are the same as those used by the United States Bureau of Fisheries in conducting surveys of oyster grounds in other States.

The approximate position of an oyster ground having been pointed out by the local assistant, the Chief Engineer, with the survey party on the launch "CANVASBACK," runs a zigzag or parallel series of sounding lines over it (see figure 6) the object of which is to ascertain the exact limits of the ground, the depth of water over it and the condition of the bottom.

A copy of a polyconic projection, known as a boat sheet, showing the shore line of the region being surveyed, and the plotted positions of the signals erected on shore, is spread upon a chart board in front of the hydrographic engineers. By

[34]Changes having been made in the personnel of the party as the survey progressed from one section of the State to another, the names of employees are omitted.



No. 5224C.

FIG. 4—SEXTANT.

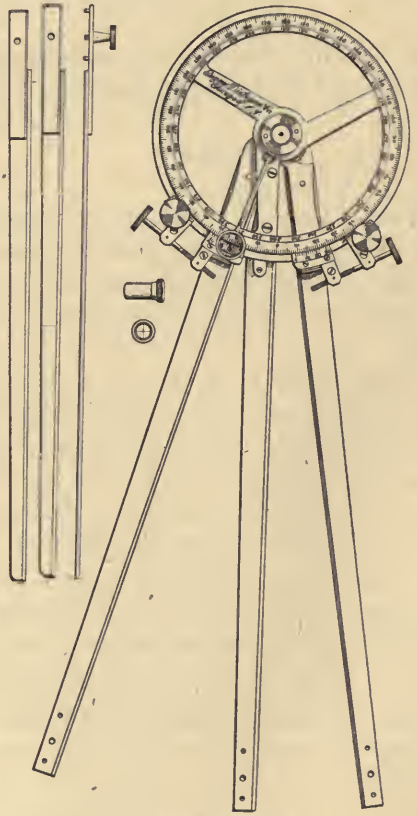


FIG. 5—PROTRACTOR.

means of a three-arm protractor,[35] or position finder, the positions of the launch at the end of two or three minute intervals, while running the sounding lines, are plotted on this boat sheet by the chief engineer, the locations of the launch being ascertained by means of sets of angles taken simultaneously by the engineers observing three signals on shore with sextants.[36] By connecting consecutive positions, as they are plotted, with straight lines the course of the lines of soundings is shown on the boat sheet.[37]

The three-point problem, which is involved in locating each of the positions occupied during the survey, is illustrated by figure 7, in which X represents the launch and A, B and C the signals on shore. The angles AXB and BXC are those taken by the engineers with *sextants* to locate their position at X. The right-hand angle BXC (75° 48′) is transferred to the vernier between the middle arm and right arms of the *protractor* and the left-hand angle AXB (58° 16′) is transferred to the vernier between the middle and left arms. When the protractor is thus set and laid on the chart in such position that the left arm passes through the plotted position of signal A, the middle arm through the plotted position of signal B and the left arm through the plotted position of signal C the point in which the three arms of the protractor meet, the centre of the hub, is the point on the chart representing the position of the boat when the sextant angles were taken.

All angles taken during the survey by the engineers are transferred to the protractor and plotted on the boat sheets by the chief engineer, while the assistant engineer records the angles in an angle record book.

---

[35]A three-arm protractor (figure 5) is an instrument used for plotting observations with sextants of two angles to three known points for the location of the point of the observer.

The description of the theory of the sextant and protractor and their use in hydrography requires the use of language too technical to be of general interest.

[36]A sextant (figure 4) is an instrument constructed for measuring the angle between two objects on shore (signals) from the position of the observer.

[37]See also pages 23-25, Coast and Geodetic Survey Report, Survey of Oyster Bars, Anne Arundel County.

During the progress of the launch over an oyster ground the leadsman, occupying a cage attached to the roof on the starboard side, forward, throws his lead line at intervals of 15-20 seconds, measuring the depth of water and testing the bottom at each cast. Having made a sounding the leadsman reports the depth of water, in fathoms and feet, and the character of the bottom in the following terms: soft, sticky, hard or grassy.

The recorder, seated in the after part of the launch with a clock before him, notifies the leadsman at the end of each 15-20 second interval, by means of an electric bell, when it is time for soundings to be made, and in a sounding record book records the findings of the leadsman in the following symbols: S (soft), St. (sticky), H (hard), G (grassy).

The local assistant, operating the chain apparatus (see frontispiece) from the forward port side of the launch, tests the oyster ground at the end of each 15-20 second interval and reports to the recorder his findings in the following terms: Barren, very scattering, scattering, medium or dense. His report is given immediately following that of the leadsman and is recorded in the sounding record book with the initial letters of the terms used to describe the condition of the ground.

The chain apparatus[38] as it appears in operation is shown in the frontispiece of this report.

It consists in a drag made up of three pieces of chain fastened to the middle and ends of a wooden bar two feet in length, to which by means of a short wire bridle a stout copper wire is attached. To this wire, near the point where it passes to a reel on the launch, a short slender wire is joined, by means of a hook, which leads to a resonanter fastened to the roof of the launch. When running a line of soundings the drag at the end of the stout wire is towed over the bottom, and from the vibrations or lack of vibrations on the wire the condition of the ground is inferred. The vibrations are detected by the hum of the resonanter or by holding the wire in the hand.

[38]In the form as used until recently the drag on the chain apparatus consisted of but a single piece of chain and there was no resonator attached.

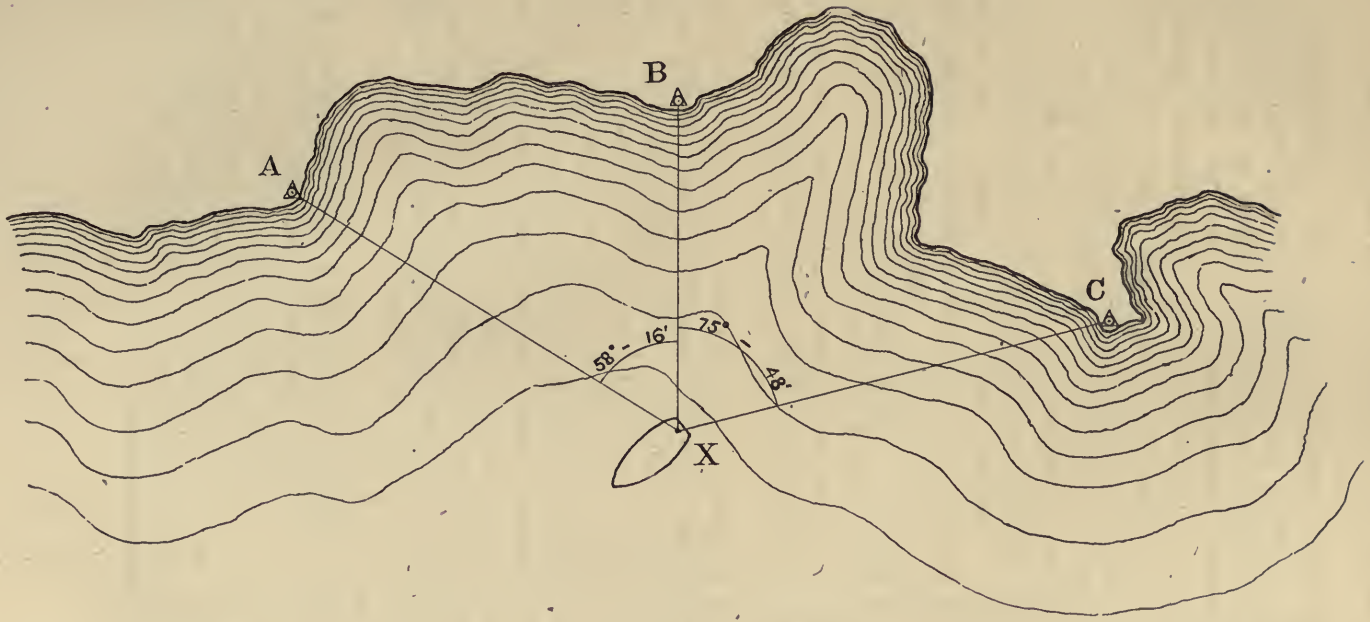


FIG. 7.

DRAWING TO ILLUSTRATE METHOD OF FINDING POSITIONS OF THE SURVEY LAUNCH OVER OYSTER GROUNDS. A, B AND C: SIGNALS ON SHORE. POSITIONS OF OBSERVERS IN SURVEY LAUNCH. A X B AND B X C: ANGLES OBSERVED BY ENGINEERS WITH SEXTANTS.

When the drag is passing over barren bottoms the chains tow smoothly and evenly and no vibrations are transmitted to the wire, but when shells or oysters are struck by the chains the wire is made to jerk and vibrate. If the vibrations are infrequent the inference is that shells or oysters are very scattering and when the vibrations become more frequent or constant a scattering, medium or dense growth of oysters is inferred.

A small boat containing small buoys with 10-pound dumbbells for sinkers is towed behind the launch at a distance such that it remains above the chain drag. At one or more points on each line of soundings small buoys are cast over to mark stations to be occupied and examined by the "INVESTIGATOR" which, with an expert tongman, follows the survey launch (see page 37). The position of each buoy on the line of soundings and the number of each is recorded in both the angle record and sounding record books. Their positions are also plotted on the boat sheets, being indicated by small flags (see frontispiece).

Between consecutive plotted positions of the launch in a line of soundings, shown in figure 8 by the numerals above the lines (32-41), seven observations of the depth of water, character of the bottom and condition of the oyster ground have been made. The positions of these observation stations are plotted on the lines of soundings by dividing the part of the plotted line between consecutive positions of the launch into eight equal spaces, the points separating these spaces indicating the positions of the sounding stations. The findings of the local assistant with the chain apparatus at these stations are indicated by writing the symbols B, S, M or D below the lines, as shown in figure 8.

The results of the use of the chain apparatus having been thus plotted on the lines of soundings, the limits of the oyster or shell covered bottom are then shown upon the boat sheet by drawing a line (X-Y and M-N in figure 8) across the ends of the lines of soundings through the spaces which separate the soundings, indicating barren bottom, from those indicating the presence of shell or oysters.

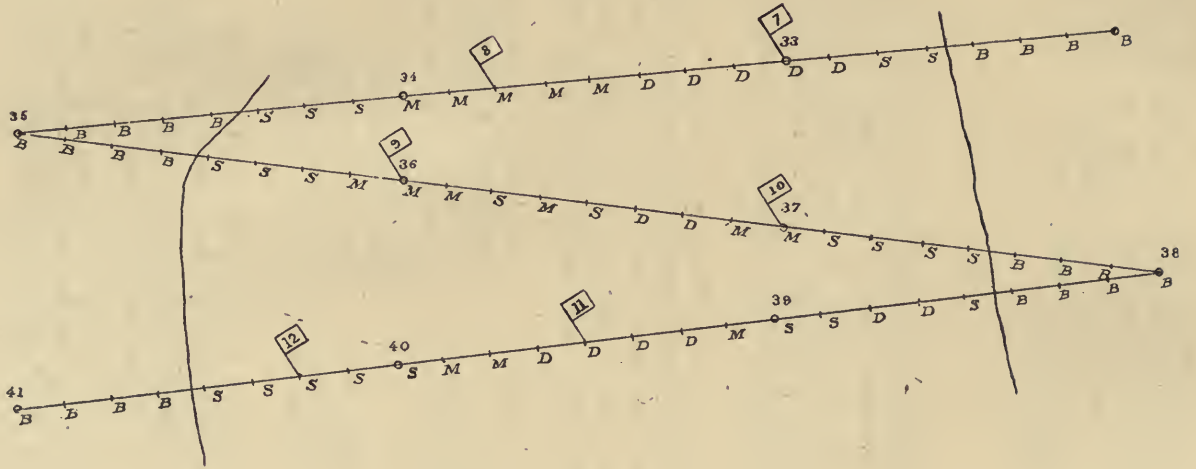


FIG. 8.

THREE LINES OF SOUNDINGS PLOTTED TO SHOW:

(A) POSITIONS LOCATED BY ENGINEERS: 33, 34-41.
(B) CONDITION OF BOTTOM: B, S, M, D, ETC.
(C) STATIONS MARKED FOR EXAMINATION: FLAGS 7, 8-12.
(D) METHOD OF PLOTTING LIMITS OF OYSTER-PRODUCING AREA: CURVED LINES.

This line, indicating the limit of the oyster-producing bottom, does not mark the official limits of the oyster ground, but it serves as a guide for enclosing the ground within a straight-sided figure (see figure 6) such as is designated shall be used to define the limits of the natural bars by Section 90 of the Haman Oyster Culture Law.

FIELD WORK.

The hydrographic survey of the oyster grounds beneath the waters of Maryland was begun in Anne Arundel County on the 29th of June, 1906. The time previous to this date, from the appointment of the Commission, was occupied with getting together a survey party and an equipment for carrying on the survey work.

Survey operations were carried on until September 12th from Annapolis, in Severn River, Annapolis Roads and nearby sections of the Bay. On September 12th the houseboat Oyster was put into commission and she has since been headquarters for all field work.[39] Her anchorages have been as follows:

Galesville, West River.....September 13 to November 4.
Annapolis .....November 4 to November 8.
Revell, Magothy River.....November 8 to November 30.
Lake Shore, Bodkin Creek.....November 30 to December 10.
Annapolis .....December 10 to May 2 (1907).
Crisfield .....May 2 to July 13.
Inverness, Manokin River.....July 13 to August 27.
Inverness, Piney Island.....August 27 to August 30.
Mt. Vernon, Wicomico River.....August 30 to September 30.

The work carried on by the survey party, classified under various headings, during each month from the date of beginning field work until the end of the fiscal year, September 30, 1907, is given in the tables printed on pages 119 and 120.

[39]From December 10, 1906, to May 2, 1907, the survey party, with the exception of the engineers and two laborers, was disbanded and the work of duplicating records and preparing leasing charts was carried on in the office in the State House.

Statistics Hydrographic Field Work, June 25 to October 1, 1906.

Months Engaged.	June 25-30.	July.	Aug.	Sept.	Total.
Days engaged erecting signals	2	13	6	....	21
Days engaged cutting in signals	..	1	....	....	1
Days engaged making boat sheet projections	..	....	2	....	2
Days engaged erecting tide gauges	..	....	....	1	1
Days engaged in hydrography	..	10	13	18	41
Days engaged in other work	4	....	....	2	6
Sundays and Legal Holidays	..	6	4	6	16
Rainy and stormy days	..	1	6	3	10
Miles of sounding line run	..	40.6	56	98.3	194.9
Number of soundings taken	..	4,991	6,119	11,358	22,468
Number of angles observed	..	1,066	1,564	2,640	5,270
Number of positions taken on sounding lines	..	533	782	1,320	2,635
Number of square miles surveyed	..	....	....	....	18.82
Number of acres surveyed	..	....	....	....	12,046

Statistics Hydrographic Field Work, October 1, 1906, to October 1, 1907.

Months Engaged.	1906. Oct.	Nov.	Dec.	1907. Jan.	Feb.	Mch.	Apr.	May.	June	July.	Aug.	Sept.	Total.
Days engaged erecting and cutting in signals..	.....	.....	.....	....	....	....	....	10	1	1	.....	1	13
Days engaged making boat sheets.....	.....	.....	.....	....	....	....	....	1	.....	1	.....	.....	2
Days engaged erecting tide gauges.....	1	1	.....	....	....	....	....	1	.....	2	.....	1	6
Days engaged in hydrography.....	12	18	3	....	....	....	....	2	7	7	13	5	67
Days engaged in office work (State House)....	.....	.....	9	9	11	3	5	1	.....	.....	.....	.....	38
Days engaged in special exam'atn of oyster bars	.....	.....	2	1	1	3	....	....	.....	.....	4	.....	11
Days engaged in work at buoy station and office	.....	.....	5	13	4	2	5	....	.....	.....	.....	.....	29
Days engaged establishing buoys in A. A. Co. and in office work.....	.....	.....	.....	2	2	11	14	2	.....	.....	.....	.....	31
Days engaged establishing buoys A. A. Co. and erecting signals Somerset Co.....	.....	.....	.....	....	....	....	....	2	.....	.....	.....	.....	2
Days engaged moving houseboat, launches and equipment	.....	.....	.....	....	....	....	....	2	.....	1	1	2	6
Days engaged examining crabbing areas.....	.....	.....	.....	....	....	....	....	1	2	2	1	.....	6
Days engaged resurveying and charting old oyster lots.....	.....	.....	.....	....	....	....	....	.....	10	6	5	5	26
Days engaged repairing launches.....	.....	.....	.....	....	....	....	....	.....	.....	2	.....	.....	2
Days engaged establishing buoys, Somerset Co.	.....	.....	.....	....	....	....	....	.....	.....	.....	.....	8	8
Days engaged in office work and on houseboat.	.....	.....	.....	....	....	....	....	1	1	3	1	.....	6
Days engaged in other work.....	.....	3	2	....	1	1	1	.....	.....	.....	.....	.....	8
Days unfavorable weather conditions.....	14	3	3	1	5	6	1	4	4	1	2	2	46
Sundays and Legal Holidays.....	4	5	7	5	4	5	4	4	5	5	4	6	58
Miles of sounding line run.....	71.5	81.2	21.5	....	....	....	....	15.8	63	70	106.6	37.9	467.5
Number of sounding taken.....	6,362	7,132	1,381	....	....	....	....	1,353	4,018	3,704	6,238	2,297	32,485
Number of angles observed.....	1,678	2,100	384	....	....	....	....	372	1,288	926	1,804	874	9,426
Number of positions located on sounding line..	839	1,050	192	....	....	....	....	186	644	463	902	437	4,713
Area surveyed, square miles.....	.....	.....	.....	....	....	....	....	.....	.....	.....	.....	.....	86.39
Area surveyed, acres.....	.....	.....	.....	....	....	....	....	.....	.....	.....	.....	.....	55,287

The survey of the oyster grounds of Wicomico County has been completed as this report goes to press, and the work in Worcester County has been started.

RESULTS.

The results of the work of the survey party of the Shell Fish Commission and the parties designated from the U. S. Coast and Geodetic Survey and Bureau of Fisheries to co-operate with and assist the Commission in carrying out the provisions of Sections 86 and 89 of the Haman Oyster Culture Law, are summed up in the following pages, although some of the results do not properly come under the head of hydrography.

1. A complete series of *triangulation stations* has been established on shore in Anne Arundel, Somerset and Wicomico Counties and permanent monuments have been erected at each. The location of each station has been carefully described and its bearing and distance from other stations are, or will be, published. (See report—"Survey of Oyster Bars."—Anne Arundel County, Coast and Geodetic Survey, 1907).

2. A *triangulation framework,* permanently establishing the geographical position of each triangulation station, has been constructed for use in definitely fixing the location of all natural oyster bars and lots leased for oyster culture.

3. *Boundary lines* have been established and described betwen the *territorial limits* of Anne Arundel and Somerset County waters and the waters adjacent thereto, and limiting the waters outside the territorial limits of these counties, beneath which the barren bottoms can be leased for oyster culture with said counties.

4. The *natural oyster bars* beneath the waters of *Anne Arundel* and *Somerset County waters* and the waters adjacent thereto have been surveyed and the exact *locations* of the corners of each have been *described* and *established* with reference to triangulation stations on shore and marked with buoys.

5. All *lots* taken up under former laws for the purposes of oyster culture, which have been leased under the Haman Oyster Culture Law, in accordance with Section 108, have been *resur-*

veyed and *described* with reference to triangulation stations on shore.

6. A duplicate series of nine *polyconic projections* have been *constructed* on which the sextant positions, which determine the location of the legal boundaries of the natural bars in *Anne Arundel* County, have been plotted. A similar duplicate series of projections showing the location of the legal boundaries of the natural bars and crabbing grounds of *Somerset* County are in process of construction as this report goes to press.

These projections, together with the angle and sounding record books which have also been duplicated, constitute the original records of all positions established by the Commission and will be filed, one series in the office of the Commission at Annapolis, the other in the office of the Coast and Geodetic Survey in Washington.

7. A large edition of a series of four *charts,* prepared from the projections above mentioned and from data previously gathered by the Coast and Geodetic Survey, showing the natural oyster bars of Anne Arundel County waters and waters adjacent thereto; the location and names of all landmarks used in making the survey; the boundaries of the waters within the territorial limits of the county and the boundary of the water not within these limits but open for leasing with the county; the lines showing the 6, 18, 30 and 60-foot curves, with various other topographical features, have been published by the Coast and Geodetic Survey on the scale of 1 part in 20,000 and filed with the Commission for distribution.

8. A *progress map* has also been prepared and published by the Coast and Geodetic Survey, on a scale of 1 part in 100,000 covering in outline the entire area of the county and giving the scheme of the projections and published charts, showing all triangulation stations and boundary lines of county and adjacent waters.

9. A series of 13 *leasing charts* have been constructed by the Commission covering the entire area surveyed in Anne Arundel County and are on file in the office of the Commission at Annapolis. Those covering areas in which lots, leased for oyster culture, are limited to ten acres are on a scale of 1 part in

5,000. Those covering areas in which lots containing 100 acres may be leased are drawn on a scale of 1 part in 10,000. These charts show the triangulation stations, natural oyster bars and the lots now leased in the county for oyster culture. To facilitate leasing, the barren bottoms in sections within county limits have been divided into squares of one acre each, and those in sections outside these limits into squares of four acres each.

STATE BUOYS.

CONSTRUCTION.

Provision is made in Section 86 of the Haman Oyster Culture Law for marking the corners of all natural oyster bars with buoys to enable oystermen to see, before the period has elapsed during which appeals may be made to the Circuit Court, that none of the natural bars have been missed by the survey party.

Since the number of buoys required to mark the corners of the natural oyster bars in the State will be very large, probably not less than 3,000, the problem of constructing a buoy which will be satisfactorily permanent and at the same time not too expensive for practical use, has been difficult.

The third and fourth class spar buoys used by the Light House Board for marking channels were first considered as types of buoys to be adopted for use in marking the corners of the natural bars, but on account of the cost of such buoys ($15.65 and $6.30) the adoption of a different type was found necessary.

The type of buoy used to mark the corners of the natural oyster bars in Connecticut was also considered. This buoy consists of a pine sapling, made fast just below its center, by means of a rope, to a burlap bag filled with 150 pounds of sand. Although simple in construction and reasonable in price this buoy was not adopted by reason of its lack of durability. With such a buoy marking the corners of the oyster bars in Maryland, the continuous services of a special engineer to replace the buoys carried away by ice and storms would be found necessary.

The two types of buoys adopted by the Commission were designed by the chief engineer. The plan of the construction of the larger is shown in figure 9.

The larger buoy (a), is composed of a spar and sinker and a mechanism of iron for connecting the two. The spars, 20-50

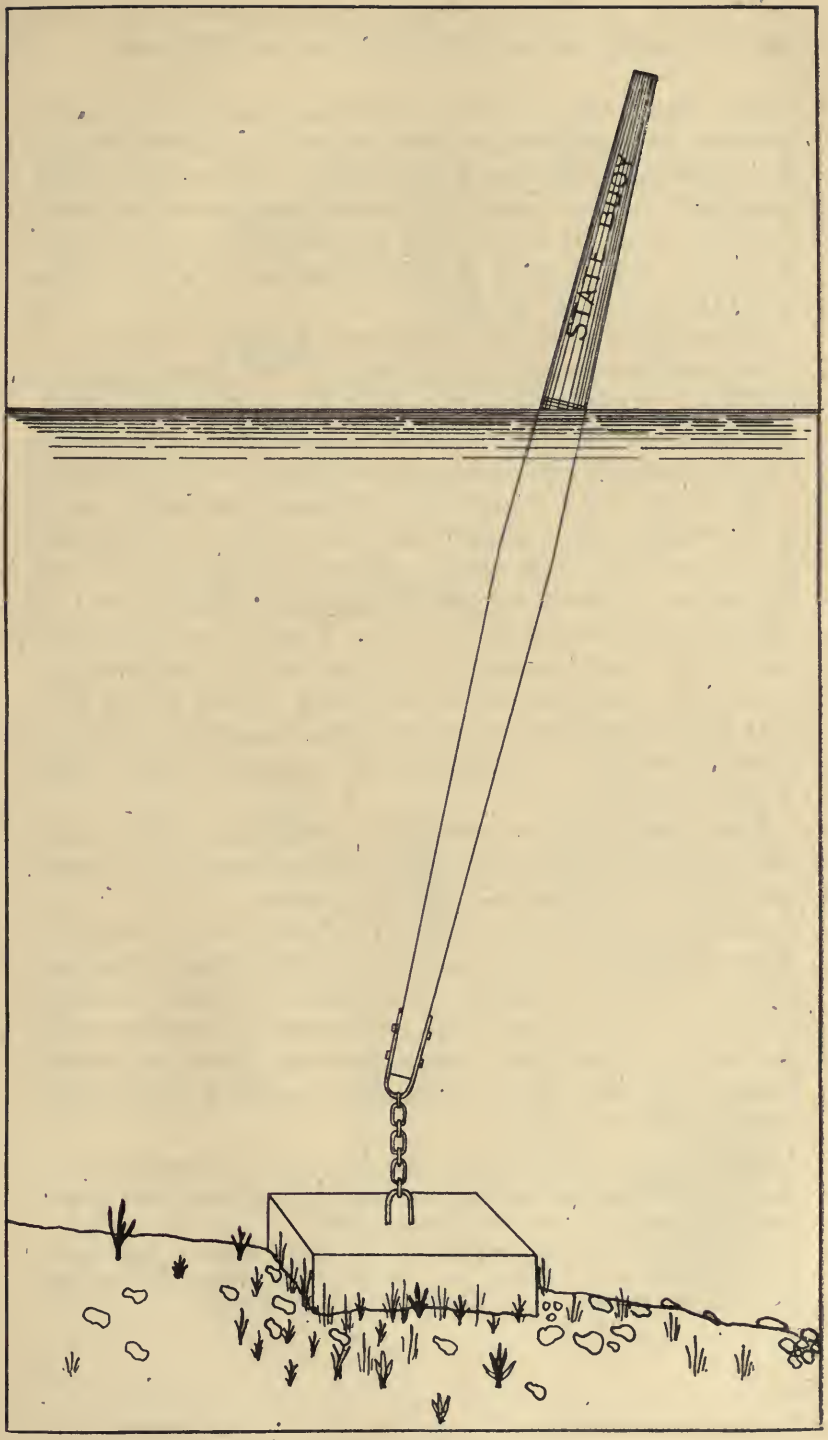


FIG. 10—STATE BUOY IN POSITION.

feet in length, are made from cypress[40] saplings and trees. The saplings, when the bark has been removed, are allowed to season. Then the part of each spar which, when in use, will be submerged is given a coat of copper paint to protect it against ship-worms, the upper part being painted white. To the top of each spar a flag, made of cotton ducking, with the words (STATE BUOY), is nailed.[41]

The sinker or anchor by which the spar is kept in position is a concrete block (c, d, e, f,), in which a ¾-inch iron staple is embedded. These blocks of concrete are of three sizes weighing respectively 300, 500 and 800 pounds and are constructed by the Commission at buoy stations established for this purpose.

The mechanism for connecting the spar to the sinker (g, h, j, k.), consists of a U-shaped piece of wrought iron, attached to the lower end of the spar by means of lag screws and bolts, and a chain. The sides of the U-shaped piece are flattened to a thickness of ½-inch and a width of 2-inches, but the middle part is left round to prevent its being worn by the friction of the chain. Two sizes of chain are used, ½-inch and ¾-inch, with simple split links to join the ends of the chain when it is passed through the U-shaped iron on the spar and the staple in the sinker.

The average price of these buoys completed is $2.57 each, the average cost of the spars, $1.05, that of the sinkers, 92 cents and that of the connecting part, 60 cents.

Stake buoys are used to mark the corners of oyster bars over which the depth of water does not exceed 10 feet. They are made of bull-pine saplings, from which the bark has been removed. As in the case of the floating spars, the part beneath the water is painted with copper paint, the upper part painted white. The lower end is sharpened to facilitate driving or pumping into the bottom.

[40]Bull pine saplings could not have been used for floating spars on account of the tendency to waterlog and sink, but such saplings have been used for stake buoys in shallow water.

[41]These flags have not been used on the buoys placed in waters outside Anne Arundel County, the words (State Buoy) having been branded into the wood near the top of the spar instead.

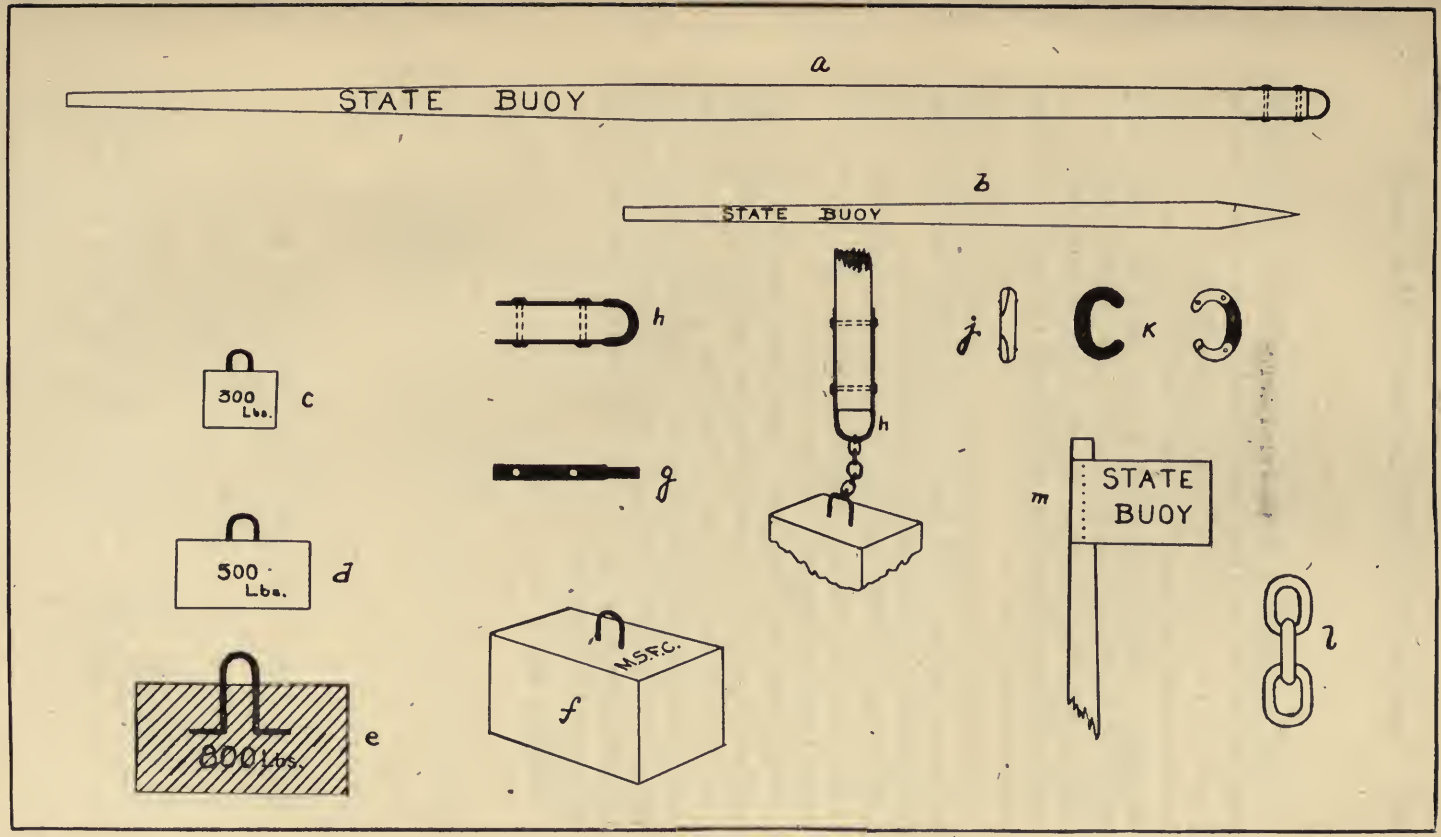


FIG. 9.

ILLUSTRATING CONSTRUCTION OF STATE BUOYS.

ESTABLISHMENT.

When the limits of the natural bars have been ascertained and the corners have been established by the Commission and plotted on the projections, buoys, adapted to the depth of water at each corner, are selected, placed on the scow and taken, by the launch "CANVASBACK" or the steamer "GOVERNOR ROBERT M. McLANE," to the places for which they were designed. The exact location of each corner is ascertained by the chief engineer by the use of sextants, and the buoys are dropped under his direction.

The work of placing the buoys in Anne Arundel County was begun in January, 1906, but ice and northerly gales so interfered that it was not completed until May 17.

The total number of buoys placed in Anne Arundel County is 362, and the number required for marking the corners of the natural bars in Somerset County is 154.

Very few of the buoys which have been placed thus far have been moved by ice or storms but, since the life of a buoy which receives no attention after having been placed, is not longer than 1-2 years, they will have to be replaced finally and the services of additional engineers and equipment will be required, provided this work is not to be allowed to interfere with the progress of the survey.[42]

[42]See page 204.

RESULTS OF THE SURVEY OF THE NATURAL OYSTER BARS.

INTRODUCTION.

The description of the survey of the waters of and adjacent to Anne Arundel and Somerset Counties is made as brief as is consistent with completeness and accuracy, by the use of a statistical form for presenting the facts which lend themselves to such a method.

The natural oyster bars of Anne Arundel County are enumerated, and the location and condition of each is indicated in tables on pages 140 to 144. All bars located in tributaries of the bay, designated for tonging operations, are enumerated in the order in which they would be passed by following the coast line of the county from Rock Point, the northern limit of all oyster grounds, to Holland Point. The bars located in the bay designated for tonging operations and those designated for dredging then follow in the same order.

In enumerating the natural bars in Somerset County, a similar plan is followed except that the enumeration begins with those in the most southern section and ends with those in the section furthest north. The bars designated for tonging operations are enumerated first; those for scraping operations second and those designated for dredging last.

All facts and deductions of special interest to prospective lessees of barren bottoms for the purposes of oyster culture, ascertained during this or previous surveys, are given in the text.

ANNE ARUNDEL COUNTY.

Areas Designated for Tonging Operations.

Magothy River.

(Chart of Natural Oyster Bars, Nos. 1 and 2.)

Magothy River is a body of water about four miles in length. Its width at its mouth is not quite a half mile, but it rapidly expands until in the region of Sillery Bay it becomes two miles

in width. From Sillery Bay to the head waters of the river the width averages about one mile. Four small tributaries enter from the south and five from the north. The currents are tidal in origin and attain a velocity of .17 to .25 mile per hour in the main channels. Over the oyster grounds which with one exception are situated near the shore, the observed velocities ranged from .04 to .14 mile per hour. The density of the water during the period covered by the survey (November 16-26) varied from 1.0082 to 1.0114, very little difference having been noted between the density near the mouth of the river and that of its head waters. The period covered by the survey is that when the water in this section may be expected to contain more salt than at any other season of the year. This is due to the fact that the quantity of fresh water entering the rivers and Bay is then at its minimum. During the spring the density of the water is probably as low as 1.004.

During the survey of Magothy River, oyster grounds were surveyed and examined in seventeen localities, but ten of these were found to be so depleted as not to yield a livelihood to tongmen. The area of these depleted grounds aggregated about one hundred acres. The total area of the seven oyster grounds which were charted and buoyed as natural bars, is two hundred and twenty-six acres. The oyster grounds are located on both sides of the river in a belt parallel with the shore, the average depth of water over them being about ten feet. Their inshore boundaries are in a depth of about five feet and the bottom is hard, but the depth of the off-shore boundaries is about sixteen feet and the bottom sticky.

Magothy River has long since ceased to be a center for extensive tonging operations on account of the depleted condition of the oyster grounds, and hence offers an excellent opportunity for oyster culture on a limited scale. There are probably three hundred acres of bottoms on which oysters can be successfully grown from *planted seed*,[43] and the difficulty of protecting private oyster grounds is probably less in this river than in any other section in Anne Arundel County.

[43]See page 182.

White Hall Creek.
(Chart of Natural Oyster Bars, No. 2.)

White Hall Creek, situated adjacent to Annapolis Roads between Hackett and Greenbury Points, is in reality a small bay, having an area of about one square mile, into which three creeks enter from the north. It contains two small bars having an area of forty-six and six acres, respectively, and a small part (110 acres) of a large bar, the greater part of which is located in the adjoining section. The off-shore boundaries of these bars are covered by water eight to fifteen feet in depth, but the in-shore boundaries of each follows the six-foot curve. The greater part of the oyster-producing bottoms is composed of hard sand, but as the central part of the section is approached the sand becomes mixed with an increasing proportion of mud until the bottom becomes loose and soft. The density of the water over the northern part of *White Hall* bar was 1.0036 on August 6, 1906, but on December 11 it had increased to 1.0108. No observations on the velocity of the currents were made in this section.

The barren bottom which can probably be made productive is situated between the natural bars and above *Sand Spit* bar and aggregates about fifty acres. This includes about ten acres of the oyster ground just north of *White Hall* bar which was found to be too depleted to be included as a part of this bar.

Severn River.
(Chart of Natural Oyster Bars, No. 2.)

The oyster-producing part of Severn River terminates at a point at the head of Round Bay about eight miles above the mouth of the river as established by a line connecting Greenbury and Tolly Points. The river at its mouth, as above defined, includes a part of Annapolis Roads and is about two miles wide, but from Annapolis to Round Bay its average width is about one-half mile. A chain of natural oyster bars, twenty-four in number, aggregating an area of 989 acres, occupies practically all of the bottom on both sides of the river between the

six-foot curve near the shore and the eighteen-foot curve near the main channel. Were it not for the muddy channels of the numerous creeks, tributary to the river, the oyster-producing area would form a continuous belt on both sides of the main channel. No observations of the rate of flow of currents were made, but from the fact that all of the oyster grounds which are well covered with clean shells received a good catch of spat during the seasons of 1905-1906 and 1906-1907, a rapid movement of the water may be inferred. The density of the water during July was 1.0036-1.0048, but it gradually increased to 1.011 in December. During the following March the density had fallen to 1.0096, the spring rains having begun to affect it.

Ten parcels of ground located in the oyster-producing area, varying in size from two to seventeen acres, aggregating an area of seventy-five acres, were found in a condition too depleted of both oysters and shells to be charted and buoyed as natural bars or parts of natural bars. In addition to these exhausted oyster bottoms, there are probably about one hundred acres of ground in Severn River which may be made to produce oysters by first planting shells to harden the bottom and then planting seed oysters.

South River.

(Chart of Natural Oyster Bars, No. 3.)

In area, extent and natural features the oyster-producing section of South River is very similar to that of Severn, although about two miles less in length. Seven tributaries enter the river from the south and nine from the north, the channels of which are mainly responsible for the division of the oyster-producing belts into eighteen natural bars, eight situated south of the main channel and nine north of the same. One large natural bar, located in the mouth of the river where the channel becomes less definitely defined, extends from shore to shore. Small parts of two other large bars extend across the line, from Thomas Point to Sanders Point, marking the boundary of the mouth of the river, but for convenience in description these bars are considered to be in the Bay. The total

area of the natural bars is 1,459 acres. Their in-shore boundaries are usually located in water from four to six feet in depth over a bottom composed of hard sand. The bottom gradually becomes softer, as the depth of water increases, until the off-shore boundaries of the bars are reached on bottoms composed of very soft mud in water from twelve to eighteen feet in depth. The width of the oyster-producing bottom seems in most cases to be determined by the extent of bottoms having the consistency required to support oysters or shells at or near its surface. The observed velocities of currents in the main channel near the mouth of the river varied from .12 to .48 mile per hour; over the oyster bars from .09 to .17 mile per hour. The density of the water during the period covered by survey (September 19-October 12) varied from 1.006 to 1.0108 near the mouth of the river and from 1.005 to 1.009 in the head waters.

Thirteen small areas of surveyed bottom, ranging in extent from 1.6 acres to 20 acres, aggregating a total of 95 acres, were found too depleted of oysters or shells to be included with the natural bars. In addition to this area, there are about 100 acres of bottom in South River which could be utilized for the purposes of oyster culture.

Rhode River.

(Chart of Natural Oyster Bars, No. 3)

Rhode River is a small stream two and one-half miles in length and one-fourth to one-half mile in width. Four tributaries enter it from the north and one from the south. The natural oyster bars in the lower part of the river have locations with reference to the shore line similar to those in the rivers previously described, but the bars in the upper part, due to the presence of islands, seem to be arranged promiscuously. The natural bars, ten in number, aggregating a total area of 109 acres, are all small, varying in extent from four to nineteen acres, and, with two exceptions, they were found to be in a very unproductive condition. The bottom in most of the places examined is very soft and muddy. Firm sandy bottoms were

found on *Cheston Point* and on *High Island* bar the bottom was found to consist of coarse gravel to which an abundant catch of spat was attached. The depth of water over the bars ranged from six to twelve feet. Observations of the rate of flow of the currents at the time when the water flows fastest are lacking, but a velocity greater than .25 mile per hour is probably not developed. Over the natural oyster bars in the vicinity of the islands currents were observed having a velocity of .047 to .09 mile per hour.

Five parcels of surveyed bottom, aggregating an area of 14.5 acres, were thrown out as not sufficient in value to tongmen for charting and buoying as natural oyster bars. The bottoms in Rhode River which are available for lease are not recommended for oyster culture.

West River.

(Chart of Natural Oyster Bars, No. 3.)

West River is also small, being 2.5 miles in length and .66 mile wide at its mouth. It receives seven tributaries, five of which enter from the north and west. The natural oyster bars, five in number, containing an area of 132 acres, are situated in water varying in depth from four to twelve feet. The oyster-bearing bottom is composed mainly of sand, although soft mud is found near the off-shore limits of the bars. One small bar near the mouth of the river has a soft muddy bottom and is "lumpy." The currents in West River are very sluggish, no velocity having been observed over oyster grounds greater than .09 mile per hour. The density during October varied from 1.004 to 1.0078.

Grounds, either containing oysters in quantities too small or of areas too small to be classed as natural bars, aggregating nine acres, were found in the upper part of the river. In addition to this ground, there are about seventy-five acres of barren bottom suitable for oyster culture.

Herring Bay.
(Chart of Natural Oyster Bars, No. 4.)

Herring Bay, as bounded by a line connecting Parker Point (near the mouth of Weem Creek) and Holland Point, covers an area of 2,334 acres, of which 907 acres are natural oyster bars. *Holland Point* and *Long* bars are considered in this report, however, as situated in the Bay, and after excluding the parts of these bars which extend into Herring Bay, the total area of natural oyster bars in the section under consideration is reduced to 439 acres. This includes 99 acres which, by an order of the Court, dated Sept. 21st, has been added to the natural bars of Herring Bay, in response to an appeal by oystermen against the decisions of the Commission and in accordance with the results of a re-survey made by the Commission, on August 15 and 16, 1907, assisted by three local representatives, one of whom was appointed by counsel for the plaintiffs to accompany the Commission during the re-survey. All but twenty-eight acres of the oyster ground thus added to the natural bars had never been covered by the original survey, due to an oversight on the part of the local assistant.*

The natural bars of Herring Bay cover a considerable area of soft muddy bottom, the largest bar being located near and in the channel. Near the shore the bottom is hard and sandy. The density of the water during October, 1906, was 1.012 and on the 15th and 16th of August, 1907, it was 1.0068. The density of the water in this region probably fluctuates from about 1.005 during the spring to about 1.013 during the dry seasons of the year. Observations on the velocity of currents have been too few to yield reliable results.

There are probably ninety acres of barren bottom in Herring Bay which are suitable for oyster culture.

Chesapeake Bay and Annapolis Roads.
(Charts of Natural Oyster Bars, Nos. 1, 2, 3, and 4.)

The waters contiguous to Anne Arundel County contain sixteen natural oyster bars designated for tonging operations

*See page 204.

which vary in size from 158 to 3,510 acres and which aggregate an area of 15,992 acres. A nearly continuous belt of oyster-producing ground is formed by these bars which extends from a point just below the mouth of Magothy River to Holland Point and from the six-foot curve near the shore to, or near to, the thirty-foot curve. Some of the bars lie in coves or behind points of lands where they are sheltered, while others extend far out into the open Bay. The in-shore bars are covered with water varying in depth from six to about eighteen feet, but those located in the open Bay usually extend into water having a depth of thirty-five feet,[44] and in the case of *Sandy Point, North,* bar, and *Tolly Point* bar, oysters were found to be abundant on bottoms covered by water thirty-eight and forty feet in depth, respectively.

No general description of the bottom on which the oysters grow in the Bay can be given. On some bars sandy bottoms prevail, but large areas of sticky or soft mud, gravel, clay and fullers earth are found. The bottoms located in very deep water are, without exception, composed of very soft mud and on such bottoms oysters grow in lumps.

Observations on the velocity of currents were made in various localities with results as shown in the table below. These observations were made at a sufficient distance from shore to get maximum velocities. The rate of flow gradually diminishes as the shore is approached until very near the bank, it becomes too slow for measurement except opposite points of land.

Sandy Point, North bar	.28	mile	per	hour.
Sandy Point, South bar	.75	"	"	"
Under The Gums bar	.35	"	"	"
Thomas Point, North bar	.42	"	"	"
Thomas Point, South bar	.65	"	"	"
Old Woman bar	.48	"	"	"
Saunders bar	.62	"	"	"
Lulus bar	.92	"	"	"
Three Sisters bar	.92	"	"	"

[44] See page 50, footnote.

The density of the water over the natural oyster bars in the Bay varied during the period covered by the survey, July 20 to December 12, 1906, from 1.004 to 1.0122, over *Sandy Point, North* bar, and from 1.0066 to 1.0122 over *Holland Point* bar. For short periods during the spring the density over the entire part of the Bay adjacent to Anne Arundel County probably falls to a point as low as 1.003, perhaps lower.

Three large areas of barren bottom form gaps in the belt of natural oyster bars at the following places: one of about 1,000 acres between *Hackett Point* and *Tolly Point* bars; one of about 500 acres between *Tolly Point, Under the Gums* and *Thomas Point, North,* bars, and one of about 500 acres between *Bay Shore, Long* and *Holland Point* bars. These bottoms, although soft, can be readily hardened with shells. At certain stages of the tide the currents run over them with high velocity and the density of the water over them never falls to a point low enough to kill oysters. During the spawning season an abundant supply of oyster fry, from the oysters on the bars both above and below, is daily carried over each of the barren bottoms under discussion, and there is good reason to believe that if planted with shells these barren bottoms would produce each year more than enough seed oysters to plant all of the barren bottoms in the county which are adapted for growing marketable oysters from seed.

Areas Designated for Dredging Operations.

Chesapeake Bay.

(Charts of Natural Oyster Bars, Nos. 1, 2 and 4.)

Six large natural oyster bars, covering an area aggregating 14,278 acres, are designated for the use of oystermen who catch oysters by means of dredges. Five of these are located in the upper part of the waters of the county between a point near the Seven Foot Knoll Light House and a point about .75 mile north of Sandy Point Light House, the other in the southern section of the county between *Three Sisters* and *Long* bars.

These bars, with the exception of the *"Lumps"* (an area east of the Craighill Channel charted and buoyed to contain 7,548

acres), have their in-shore limits located near the shore in water as shallow as six feet. The off-shore boundaries of those situated above the mouth of the Magothy River are limited by a line 500 yards from the center of the Craighill Channel. Oysters grow nearer this channel than 500 yards, but dredging for oysters nearer the channel than this is prohibited by law. The off-shore boundary of *Outer Magothy* bar lies in water varying in depth from six to thirty-five feet and that of Bay Shore in depths of from twenty-five to thirty feet.

Hard sandy bottoms characterize the parts of the bars which lie near the shore, but very soft mud is found on the off-shore areas of all. The oysters on the hard bottoms grow singly and are fairly evenly distributed, but on the mud the oysters grow in "lumps" and are bunchy.

The oyster ground known as the *"Lumps,"* although covering a very large area, has in reality a comparatively small area of oyster-producing bottom. It is lumpy throughout, the lumps (patches of oysters) varying in size from a few square yards to about fifteen acres. Between the lumps large areas of very soft barren mud are found. The total area of oyster-bearing bottom on the "Lumps" probably does not exceed 400 acres and this is being gradually diminished by the deposit of a finely divided ooze from the debris dredged from the Craighill Channel and dumped over the eastern section of the lumps. During the survey empty shells and mud boxes were brought up at several of the examination stations from several inches below the surface of the bottom, the oysters having recently been smothered by the deposited material.

The velocity with which the water flows over the oyster bars is shown in the table which follows:

Bodkin Point bars	.85 mile per hour.
Mountain Point bar	.81 " " "
The Lumps bar	.95 " " "
Outer Magothy bar	.28 " " "
Bay Shore bar	.24 to .92 mile per hour.

The density of the water varied during the period covered by the survey from 1.008 to 1.012 over the *Bodkin Point* bars and the *"Lumps"* and from 1.010 to 1.012 over *Bay Shore* bar. Over

the *"Lumps"* the water probably becomes almost fresh at times during the spring and the density on the other bars at such times is no doubt very low.

Barren bottoms were found in three places: Between Rock Point and Bodkin Point, about 1,224 acres, of which 224 acres have recently become exhausted of oysters; between *Bodkin Point, North,* and *Bodkin Point, South,* bars, 119 acres; and between *Bodkin Point, South,* and *Mountain Point* bars, 984 acres. The bottoms above Bodkin Point are not recommended for oyster culture, but there are about 1,200 acres south of this point which could be made valuable by cultivation.

NATURAL OYSTER BARS OF ANNE ARUNDEL COUNTY.

Number of Bar	Name of Oyster Bar	Date of Survey and Examination	Area of Bar in Acres as Buoyed	Area of Bar in Acres as Surveyed	Number of Corners	Number of Buoys	Average Number Oysters per Sq. Yd. as Calculated from Records of Examinations		Estimate of Average Number Bushels Marketable Oysters per Acre		Estimate of Total Number Bushels Marketable Oysters on Bar	
							Culls	Counts	Season of 1906-1907	Season of 1907-1908	Season of 1906-1907	Season of 1907-1908
			Natural Bars Designated for Tonging—									
			Magothy River									
1	Welch	Nov. 17, 1906	50.	37.8	4	4	4.4	.71	10.4	35.7	393	1,350
2	Peach Hill	Nov. 17, 1906	20.	18.	3	3	8.2	.6	8.8	64.7	158	1,164
3	Sillery Bay	Nov. 16, 1906	35.	30.1	3	3	2.1	.15	2.2	16.1	66	484
4	Park	Nov. 20, 1906	34.	27.2	4	4	2.9	3.0	44 1	35.3	1,199	960
5	Umphasis	Nov. 16, 24, 1906	30.	19.	3	3	2.4	.7	10.2	21.0	193	399
6	Black	Nov. 24, 1906	25.	20.8	4	4	8.6	1.06	15.5	68.3	322	1,420
7	Persimmon	Nov. 26, 1906	32.	29.5	3	3	22.	2.05	30.1	171.8	887	5,068
			White Hall Creek									
8	Sand Spit	Dec. 11, 1906	6.	4.8	3	3	6.7	1.3	19.1	54.4	91	261
9	White Hall Creek	Dec. 11, 1906	46.	38.1	5	5	16.1	1.9	27.9	127.6	1,058	4,861
	White Hall	(See 74)										
			Severn River									
10	Inside Greenbury	July 31, 1906 / Dec. 11, 1906	70.	63	4	4	8.6	1.3	19.1	69.1	1,203	4,353
11	Old Fort	Dec. 11, 1906	45.	43 8	4	4	13.6	2.8	41.1	113.6	1,800	4,975

12	Sandy	Feb. 20, 1907	16.	25.4	3	1	3.4	1.1	16.1	30.3	257	484
13	Creces Cove	Feb. 20, 1907	10.	12.2	4	4	5.0	2.5	36.7	48.9	367	489
14	Ferry Point	Feb. 20, 1907	11.	15.2	4	4	4.1	1.8	26.4	38.9	290	427
15	Peach Orchard	Aug. 4, 1906	43.	36.9	8	8	9.0	2.2	32.3	76.4	1,191	2,819
16	Traces Hollow	Aug. 4, 1906	36.	24.5	7	7	5.7	1.8	26.4	50.7	645	1,242
17	Rock Point Lower	Aug. 8, 1906	9.	5.9	3	3	1.6	3.1	45.6	26.9	269	158
18	Chase	Aug. 16, 1906 March 15, 1907	7.5	6.1	3	3	29.9	5.6	82.3	246.5	502	1,503
19	Point	Aug 16, 1906 March 15, 1907	8.	6.4	3	3	14.6	6.8	100.	140.5	640	899
20	Aisquith Creek	Aug. 16, 1906 March 15, 1907	6.	3.7	3	3	4.8	5.9	86.7	63.1	320	233
21	Arnold Point	Aug. 16, 1906	58.	45.9	5	5	8.0	4.6	67.6	81.3	3,102	3,731
22	Rock Point Upper	Aug. 21, 1906	31.	29.3	4	4	2.6	5.0	73.5	43.5	2,153	1,274
23	Round Bay	Aug. 21, 1906	11.	17.1	3	3	31.0	2.6	38.2	240.6	420	2,646
24	Big Island	Aug. 21, 1906 March 14, 1907	6.	11.2	3	3	2.0	1.3	19.1	21.0	114	126
25	Poppin Point	Aug. 16, 1906 March 14, 1907	50.	34.6	4	4	20.5	6.5	95.5	182.5	3,204	6,314
26	Brewer	Aug. 16, 1906 March 14, 1907	21.	14.9	3	3	12.7	18 5	272.1	183.9	4,054	2,740
27	Clem Point	Aug. 16, 1906	13	10 7	3	3	8.3	1.0	14.7	66 6	157	712
28	Saltwork	March 7, 1907	12.	10.4	4	4	5.3	2.9	42.6	53.0	4 3	551
29	Sharp Point	Aug. 8, 1906 March 7, 1907	36.	24.3	3	3	14.2	1.6	23.5	112.2	571	2,726
30	Wade	Aug. 8, 1906	16.	11.7	3	3	6.0	.7	10.2	47.5	119	555
31	Weems Upper	March 7, 1907	19.	32.6	3	3	5.5	3 0	44.1	55.1	837	1,046
32	Weems Lower	Aug. 4, 22, 1906	8.5		4	4	2 2	.3	4.4	17.6	37	149
33	Horn Point	Dec. 13, 1906	194.	110.2	6	6	25.5	2.4	35.3	199.3	3,883	21,923
34	Chinks Point		252.	(With Tolley)	5	3	8.1	1.5	22.0	66.1	4,840	14,542
				South River								
35	Ruler Flats	Oct. 12, 1906	112.	75.	4	2	3.5	1.1	16.1	31.0	1,207	2,352
36	Swan Reef	Sept. 19, 1906 Oct. 12, 1906	249.	245.7	5	3	6.6	1 4	20.5	55.2	5,036	13,562

NATURAL OYSTER BARS OF ANNE ARUNDEL COUNTY—Continued

Number of Bar	Name of Oyster Bar	Date of Survey and Examination	Area of Bar in Acres as Buoyed	Area of Bar in Acres as Surveyed	Number of Corners	Number of Buoys	Average Number Oysters per Sq. Yd. as Calculated from Records of Examinations		Estimate of Average Number Bushels Marketable Oysters per Acre		Estimate of Total Number Bushels Marketable Oysters on Bar	
							Culls	Counts	Season of 1906-1907	Season of 1907-1908	Season of 1906-1907	Season of 1907-1908
37	Hill Point East	Oct. 12, 1906	22.	52.2	4	4	1.0	.2	2.9	8.2	63	180
38	Hill Point	Sept. 20, 1906	46.		3	3	12.7	1.4	20.4	100.1	938	4,604
39	Fox Point	Sept. 20, 1906	10.	4.8	3	3	29.7	1.9	27.9	227.7	133	1,095
40	Thunder and Lightning	Sept. 19, 1906	48.	42.	4	4	6.9	.5	7.3	53.0	306	2,226
41	Aberdeen	Sept. 19, 1906	40.	25.	3	3	2.3	1.2	17.6	22.7	440	567
42	Duvall	Sept. 19, 1906	32.	28.8	5	5	2.4	.7	10.2	21.0	293	604
43	Beard Point	Sept. 25, 1906	11.	17.	4	4	1.0	2.4	35.3	19.1	388	210
44	Rough Point	Sept. 25, 1906	24.	24.	4	4	1.0	2.5	36.7	19.5	880	468
45	Alms House	Oct. 12, 1906	24.	28.	4	4	3.0	.8	11.7	25.8	280	619
46	Brewer	Oct. 12, 1906	44.	36.	3	3	10.5	.6	8.8	80.1	316	2,883
47	Purdy Flats	Sept. 25, 1906	36.	25.5	3	3	2.1	1.7	25.0	23.6	637	601
48	Rock Point	Sept. 25, 1906	12.	9.5	3	3	25.7	2.1	30.8	199.3	292	1,893
49	Inner Round Point	Sept. 25, 1906	13.	9.6	3	3	6.6	1.2	17.6	54.4	168	522
50	Outer Round Point	Sept. 19, 25, 1906	66.	74.1	4	4	18.1	.6	8.8	136.0	580	8,976
51	Turkey Point	Oct. 12, 1906	61.	97.9	7	7	2.8	.7	10.2	23.9	622	1,457
52	Marshy Point	Sept. 5, 1906	609.	560.	6	4	17.6	2.6	38.2	142.0	21,392	79,520
				Roedh River								
53	*Dutchman Hollow	Oct. 3, 1906	5.	3.2	3	3						
54	*Cherry	Oct. 3, 1906	4.	2.2	3	3						

*These bars were surveyed but not examined.

55	Buce†	Oct. 3, 1906	5.5	3.2	3	3	.05	.05	.7	.5	2	1
56	Flat Island†	Oct. 3, 1906	10.	7.7	3	3	.0	.0	.0	.0		
57	High Island	Oct. 3, 1906	4.	3.2	3	3	8.2	1.3	19.1	66.6	61	213
58	Bolston Bank.†	Oct. 3, 1906	5.5	4.3	3	3	.23	.07	1.0	1.9	4	8
59	Jackass	Oct. 3, 1906	10.	8.	4	4	1.9	.07	1.0	14.2	8	113
60	Stony Hollow	Oct. 3, 1906	19.	12.2	4	4	3.9	.12	1.7	34.5	20	420
61	Brice Fence	Oct. 3, 1906	5.	3.2	3	3	2.9	.1	1.4	25.7	4	82
62	Cheston Point	Oct. 3, 1906	41.	31.4	4	4	3.8	.34	4.9	29.4	153	923
					West River							
63	Potato Hill	Oct. 5, 1906	4.	4.	3	3	7.1	.7	10.2	55.5	40	222
64	Barren Neck	Oct. 3, 1906	55.	43.2	4	4	2.3	.24	3 5	18.0	151	777
65	Tucker	Oct. 3, 1906	10.	8.	4	4	4.9	.5	7.3	38.3	58	306
66	Cedar Point	Oct. 13, 1906	39.	35.2	4	4	2.6	.7	10.2	22.5	359	792
67	Collins Flats	Oct. 13, 1906	24.	18.4	4	4	4.0	.05	.7	29.5	12	542
					Herring Bay							
	Long	(See 85)										
68	Cedar	Aug. 15, 16, 1907	49.	24.			1.3	2.3	33.8	20.7	811	496
69	Fair Haven	Oct. 2, 1906	390.	400.	5	5	2.3	5.9	86.7	45.7	33,813	17,823
	Holland Point	(Sec 86)										
					Chesapeake Bay and Annapolis Roads							
70	Sandy Point North	Aug. 31, 1906	490.	421.	5	5	24.9	.13	1.9	183.7	799	77,337
71	Sandy Point South	Aug. 28, 31, 1906	398.	340.	7	5	60.3	7.3	107.3	478.7	36,482	162,758
72	Hackett	July 27, 31, 1906 Dec. 12, 1906	1120.	1032.	8	8	89.5	14.9	219.1	729.5	226,111	752,844
73	Wreck Buoy	Not Examined	47.	33.6	4	4						
74	White Hall	Aug. 6, 1906	550.	517.6	8	8	5.6	1.2	17 6	45.6	9,109	23,602
75	Tolley Point	July 20, 21, 25, 1906	897.	1008.*	7	7	70.4	17.1	258.8	601.6	232,143	539,635
76	Under the Gums	Sept. 7, 1906	481.	482.4	6	6	8.38	1.2	17.6	67.4	8,465	32,419
77	Thomas Point North	Sept. 5, 1906	446.	367.	8	7	43.9	11.6	170.6	379.5	62,710	139,276
78	Thomas Point South	Sept. 7, 1906	508.	480.	7	5	56.8	6.4	94.1	449.0	45,168	215,520

*Includes Chinks Point Bar. †Not up to the standard.

NATURAL OYSTER BARS OF ANNE ARUNDEL COUNTY—Continued.

Number of Bar	Name of Oyster Bar	Date of Survey and Examination	Area of Bar in Acres as Buoyed	Area of Bar in Acres as Surveyed	Number of Corners	Number of Buoys	Average Number Oysters per Sq. Yd. as Calculated from Records of Examinations		Estimate of Average Number Bushels Marketable Oysters per Acre		Estimate of Total Number Bushels Marketable Oysters on Bar	
							Culls	Counts	Season of 1906-1907	Season of 1907-1908	Season of 1906-1907	Season of 1907-1908
79	Old Woman	Sept. 5, 7, 18, 20, 1906	573.	545.	4	2	14.4	4.4	64.7	127.3	35,261	69,378
80	Saunders	Sept. 18, 20, 1906 Oct. 23, 1906	544.	497.	5	2	6.9	1.7	25.0	58.9	12,42	29,273
81	Lulu	Sept. 18, 20, 1906 Oct. 23, 30, 1906	1710.	1576.	5	2	15.8	6.8	100.0	149.4	157,600	235,454
82	Dutchman	Oct. 23, 1906	644.	665.	4	2	.8	.3	4.4	7.3	2,833	4,701
83	Curtis	Oct. 25, 26, 30, 1906	158.	120.	4	4	6.2	1.4	20.5	52.3	2,460	6,276
84	Three Sisters	Oct. 23, 25, 1906 Oct 26, 30, 1906	3510.	3383.	6	3	13.4	4.0	58.8	117.6	198,920	397,840
85	Long	Oct. 2, 1906	1274.	1088.	6	4	4.8	4.3	63 2	56.3	68,761	61,254
86	Holland Point	Oct. 2, 1906	2642.	2478.	6	6	22.9	3.3	48.5	184.5	120,183	457,191
			Natural Bars Designated for Dredging									
87	Lumps E. Craighill Channel	Nov. 26, 30, 1906 Dec. 5, 1906	7548.	8000.	7	7	16.6	10.3	151.5	172.5	60,600	69,000
88	Bodkin Point North	Nov. 22, 23, 1906	547.	464.	5	5	8.2	.3	4.4	61.7	2,041	28,628
89	Bodkin Point South	Nov. 23, 1906 Dec. 1, 1906	415.	411.	4	4	7.5	.46	7.5	57.3	3,082	23,550
90	Mountain Point	Aug. 31, 1906	1630.	1630.	6	6	8.4	2.07	30.4	71.9	49,552	117,197
91	Outer Magothy	Aug. 31, 1906	1138.	1048.	5	3	13.4	.25	3.6	99.7	3,772	104,485
92	Bay Shore	Oct 2, 1906	3000.	2793.	9	7	6.8	1.02	15.0	54.9	41,895	153,335

SOMERSET COUNTY.[45]

Areas Designated for Tonging Operations.

Pocomoke Sound.

The oyster-producing section of Pocomoke Sound, belonging to the State of Maryland, extends along about twelve miles of coast line from Williams Point to Cedar Straits and, in its widest place, is about two miles in width. A continuous supply of fresh water enters this section from one only of its several tributaries, the Pocomoke River. The tide has a mean rise and fall of about 2½ feet, with a maximum of about 4½ feet, and is the chief source of the currents which flow over the oyster bottoms. The rate of flow over the natural bars was observed at the examination stations during the period covered by the survey of the section (May 29-June 27) at stages of the tide when the flow is swiftest. Near shore the observations show that currents are never swift, but that a gentle "set" of the water takes place with the tide. In the shallow water about half way between the shore and the Maryland-Virginia Line a maximum flow of about .30 mile per hour takes place. Near the State Line the maximum flow is from .68 and .79 mile per hour. Currents as swift as these were not observed in 1878,[46] but the difference in result is no doubt due to difference in method and time of observation. The table below gives the minimum and maximum densities of the water observed over the natural bars.

Date.	Name of Bar.	Minimum Density.	Minimum Temperature.	Maximum Density.	Maximum Temperature.
6:27	Kitts Creek	1.0074	80°	1.008	80°
5.29—6:17	Marumsco	1.008	66°	1.0109	73°
5:17	Gunby	1.0113	71°	1.0118	70°
5:30	Long Point	1.009	66°	1.0092	65°
5.29, 30	Watkins	1.009	66°	1.0101	65°
5:30	Stone	1.0094	66°	1.0098	66°

[45]Charts showing the location of all natural oyster bars and crabbing bottoms in the waters of Somerset County, the triangulation stations on shore and the lines bounding Somerset County waters and the waters adjacent thereto opened for leasing with Somerset County, will be published on or about February 1, 1908, by the Coast and Geodetic Survey.

[46]See page 37 of Winslow's Report.

Water deeper than twelve feet was found on none of the natural bars and no oyster ground extended beneath water shallower than four feet, the average depth being about eight feet. The oyster-producing bottoms are in the main composed of a mixture of sand and mud and are sticky or hard, but patches of hard sand, gravel, clay and soft black mud were found. In the soft bottoms clams abounded and a considerable quantity of sponge was observed attached to the shells on the bars in the western part of the sound.

Bottoms in nine localities, covering an area of 1,965 acres, having been pointed out by the local assistant as oyster producing, were surveyed and examined by the Commission. Of this area, 1,478 acres were found in a condition such as to come within the adopted definition of a natural oyster bar and was charted and buoyed as such. The remaining area of 487 acres was not charted and buoyed as natural oyster bars, it being too depleted of oysters to yield a livelihood to tongers and too depleted of shells to afford a basis for the attachment or spat in the future.

The natural oyster bars which existed in this section in 1878 covered an area of 7,296 acres, according to the survey made by Lieutenant Winslow, and are described on page 33 of the report, referred to on page 33, under the title "Pocomoke Beds." The local names by which the separate bars are known have so changed since 1878 that it is difficult to identify the bars which now exist with those surveyed by Lieutenant Winslow. This change in name is evidence which bears out the results of the survey just completed and shows that profound changes have taken place in the oyster-producing areas of Pocomoke Sound since 1878. During the interval of twenty-seven years between the two surveys 5,809 acres of oyster-producing bottoms have become so exhausted as to no longer afford a livelihood to tongers. To 487 acres only of this once productive but now exhausted oyster ground has any claim been made by oystermen and this claim is based, *not* upon the plea that the ground still produces *oysters*, but that it is valuable *clamming* bottom, a claim which the Shell Fish Commission has no authority to consider.

The continuous depletion and exhaustion of the natural bars which has taken place in Pocomoke Sound since 1878 at the

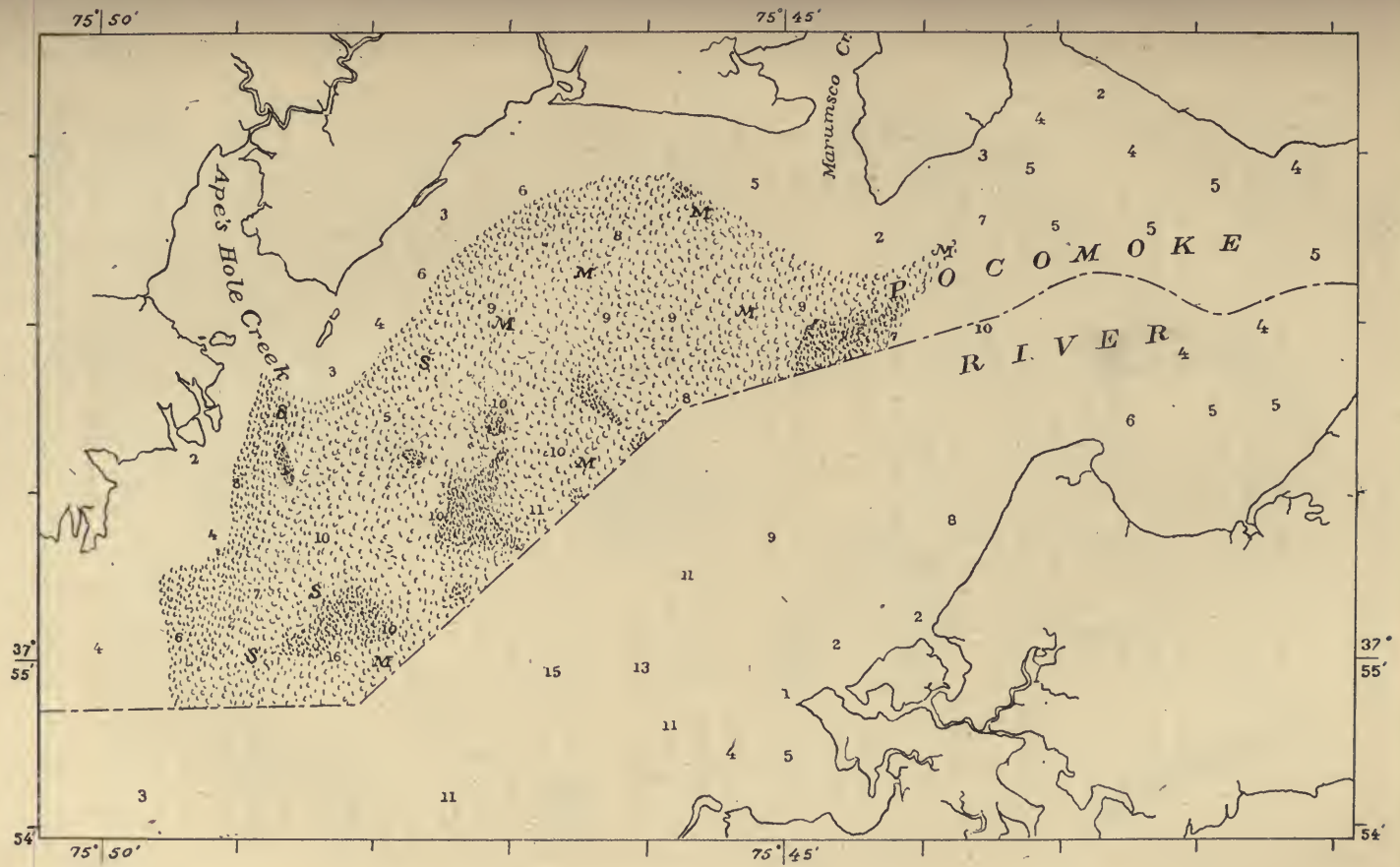


CHART 1 A—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN POCOMOKE SOUND AS ASCERTAINED BY LIEUTENANT WINSLOW IN 1878.

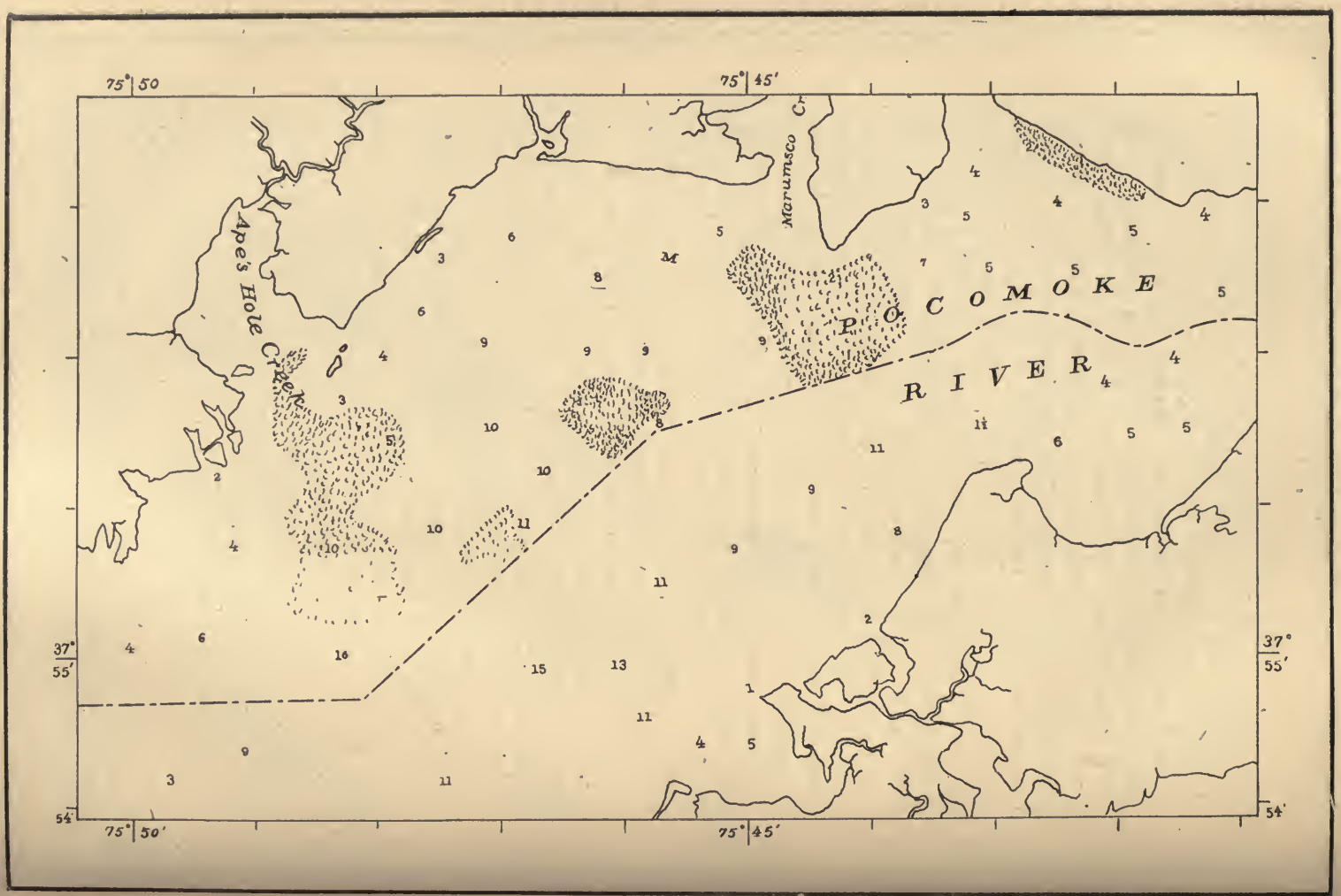


CHART 1 B—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN POCOMOKE SOUND AS ASCERTAINED BY MARYLAND SHELL FISH COMMISSION IN 1907.

average rate of 215 acres per year has an important bearing upon the criticism which has been made of the method used by the Commission in determining the status of oyster grounds:— It is claimed that such grounds as are not in a condition at the time they are surveyed to yield a livelihood will, if left alone, soon become restocked by nature and should therefore be charted as natural bars. This is sometimes true, and when the condition of a depleted oyster ground is found to be such at the time of its survey as to indicate the probability of future productiveness, it is the rule of the Commission to chart the same as a natural bar; but the history of the oyster grounds of Pocomoke Sound shows that as a rule depleted oyster grounds have not become restocked when left alone, but that they have gradually become more and more exhausted until all trace has been lost of even the names by which they were once known.

It is true that depleted oyster grounds fluctuate slightly from year to year in the quantity of oysters they produce, but the history of the oyster grounds of Pocomoke Sound indicates that the condition of a depleted ground after each succeeding improvement is not quite so good as the condition after former improvements and that each succeeding depletion is a little more extensive than former depletions.

The barren bottoms subject to lease in Pocomoke Sound for oyster culture cover an area of about 6,000 acres, of which about 500 acres are now under successful oyster cultivation. There can be no doubt of the fitness of these bottoms for oyster culture since they once produced oysters naturally. The physical and biological condition which exists now in the section are probably the same as in former years with the exception of the condition of the bottom. Lots in Pocomoke Sound can probably be stocked with oysters by planting shells at the proper time during the seasons favorable to the setting of spat, but the greater part of the bottom is more favorably located for growing oysters from seed transplanted from other sections.

Crabbing bottoms, covering an area of 2,880 acres, have been excluded from lease for oyster culture. They occupy the greater part of the territory between the coast line, from Apes Hole Creek to, and including, Cedar Straits, and the Maryland-Virginia boundary line.

Little Annemessex River.

Natural oyster bars have not existed in the Little Annemessex River within recent years, none having been charted by Lieutenant Winslow in 1878. Oyster bedding and planting have been carried on in the river to a considerable extent, however, and 82 lots, covering about 400 acres, leased under former law, are now leased for the purposes of oyster culture. The bottoms from the main channel to the shore line on both sides of the river, not occupied by private oyster lots, are nearly all covered with grass and 1,312 acres have been charted as crabbing bottom. About 100 acres of bottom suitable for oyster culture yet remain for lease.

Big Annemessex River.

For convenience in description the mouth of Big Annemessex River is considered to be fixed by the line separating the grounds designated for scraping (Tangier Sound) from those in the river designated for tonging. Measured from this line the part of the river which now produces oysters or which is adapted for the production of oysters is about seven miles in length.

The natural oyster bars occupy a large continuous area in the lower half of the river, five miles in length, averaging about .75 mile in width, containing 1,212 acres. This area extends from the six-foot curve near the shore, on the north, to and including the main channel of the river in which depths of twenty feet were noted. The average depth of water over the bar is about twelve feet. Hard sandy bottoms are found as a rule on the flats in shallow water, soft muddy bottoms being confined to the deeper water in and near the channel. Between these are hard or sticky bottoms composed of sandy mud. In the channel tidal currents are regularly developed, having a velocity .5 mile per hour, but over the greater part of the bar the water seldom flows faster than .25 mile per hour. The minimum density of the water observed was 1.0088 (August 9), the maximum 1.0105.

The charts on pages 152 and 153 show the location and extent of the oyster grounds as they exist now and as surveyed by Winslow in 1878. The area which has been depleted since the date of the Winslow survey, covering 836 acres, practically all lies on the south side of the main channel of the river opposite the mouths of Jones and Daugherty creeks.

With the exception of a small strip of shore in the vicinity of Coulbourns Creek, the entire shore line of the river from Persimmon Point is skirted with a strip of grassy crabbing bottom, varying in width from .15 to .75 mile, containing 2,304 acres.

The bottoms adapted for oyster culture and available for lease lie: Above Persimmon Point; in and near the channel from Persimmon Point to Scott Point; and near the mouth of the river south of the natural oyster bar. They contain about 1,000 acres, of which about 100 acres are now leased.

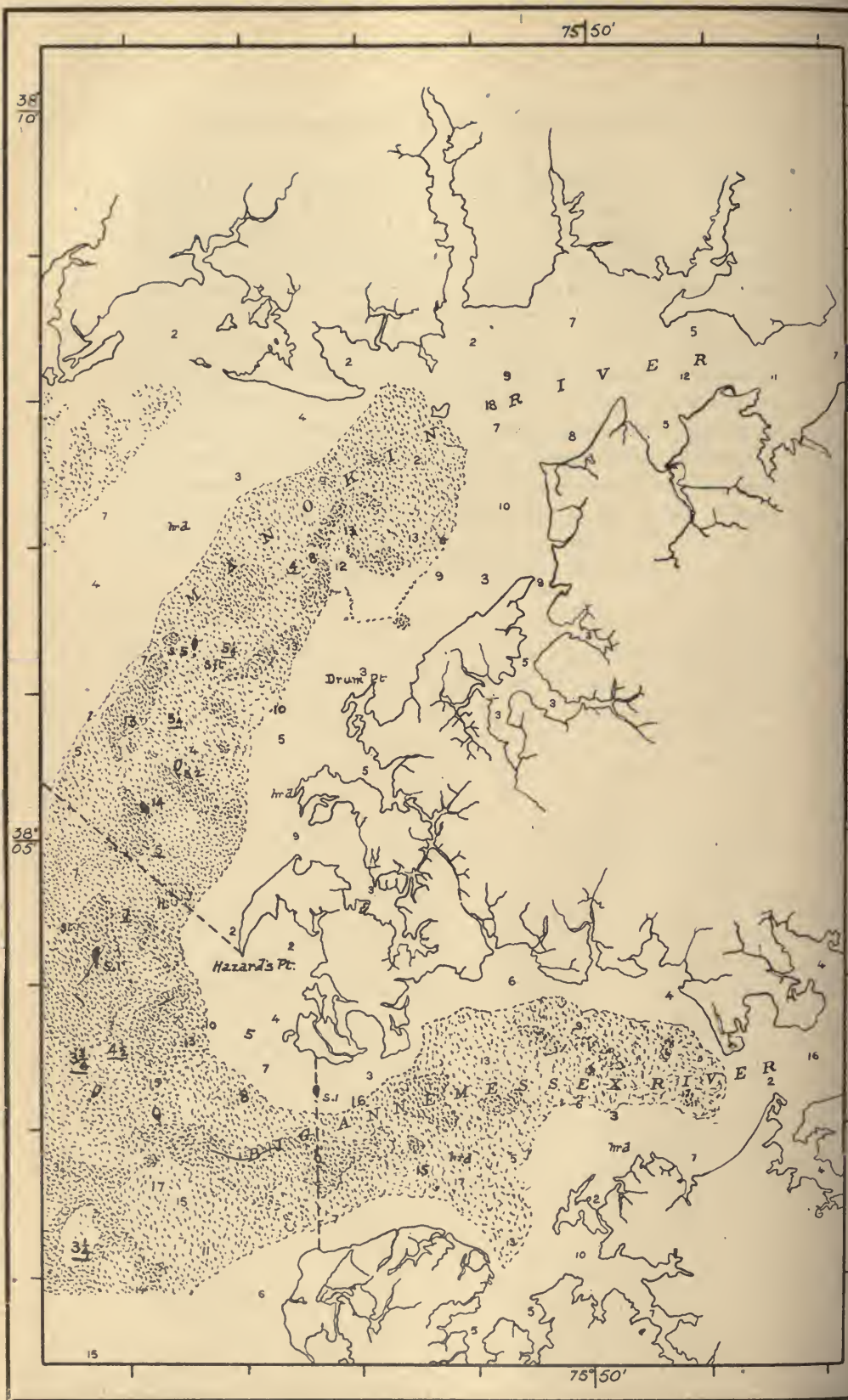


CHART 5 A. LOCATION AND EXTENT OF NATURAL OYSTER BARS OFF THE ENTRANCES TO AND IN BIG ANNEMESSEX AND MANOKIN RIVERS, AS ASCERTAINED BY LIEUTENANT WINSLOW IN 1878.

CHART 5 B—LOCATION AND EXTENT OF NATURAL OYSTER BARS OFF THE ENTRANCES TO AND IN BIG ANNEMESSEX AND MANOKIN RIVERS, AS ASCERTAINED BY MARYLAND SHELL FISH COMMISSION IN 1907.

Manokin River.

A line about three miles in length drawn from Hazards Point, above the mouth of Big Annemessex River, to the southern extremity of Little Deals Island, is considered in this report as marking the mouth of Manokin River, this line having been established to divide the area in Tangier Sound, designated for scraping operations, from that designated for tonging operations in the Manokin River.

The part of the Manokin River adapted for the production of oysters extends to the mouth of Back Creek, a point about 6½ miles above the mouth of the river. Beginning at this point, a series of five natural oyster bars covering an area of 4,552 acres, occupies the space in and on either side of the main channel to the mouth of the river. A sixth bar, *Piney Island Swash,* covering 950 acres, is situated in the deeper water below Law's Thoroughfare and in the channel between Little Deals Island and Piney Island. This bar is separated from the chain of bars mentioned above by the very extensive sand bar which extends from the vicinity of St. Pierres Island to and below Piney Island.

Manokin River is the only section in the areas designated for tonging operations in Somerset County which seems to be in a better condition at the present time with reference to its natural oyster bars than in 1878. Lieutenant Winslow carried his survey to St. Pierres Island only, finding about 4,192 acres of oyster-producing bottom below this point. In the same section of the river the Commission in 1907 found 4,482 acres of natural oyster bar. In the part of the river above St. Pierres Island, where 1,020 acres of oyster-producing bottoms now exist, Winslow found a few small rocks of such inconsiderable area that they were not shown on his charts. Charts 5a and 5b, reproduced on pages 152 and 153, show the approximate location and extent of the oyster producing bottoms as surveyed by Winslow in 1878 and the Commission in 1907.

Soft or sticky mud forms a considerable part of the bottom of the oyster bars in Manokin River, not only in and near channels, but in the shallower waters as well. There is no regularity in the distribution of oysters on these muddy bot-

toms, but patches or "lumps" of oysters of various size occur here and there separated by areas entirely barren. The lumps are so numerous, however, and so close together that it is not practical to open the barren areas for lease. A very considerable part of the bottom of the large bar, *Piney Island Swash,* situated below Law's Thoroughfare, is composed of hard sand. A continuous belt of hard bottom occurs on the north side of Marshy Island bar and also along the south side of *Drum Point* bar.

The inner boundary of *Drum Point* and *Marshy Island* bars is formed by the middle of the main channel of the river, in which the depth of water gradually decreases from about twenty-eight feet, at the lower parts of the bar, to twelve feet at their upper ends. The outer boundary of *Drum Point* bar is situated in water from nine to five feet in depth, while that of *Marshy Island* bar follows closely the six-foot curve. The average depth of water over *Carmen* and *Georges* bars is about nine feet. The outer limits of these bars are covered with water from five to seven feet in depth, while their common inner boundary, the middle of the channel, is situated in water about twelve feet deep. *Sandy Point* bar occupies the area in and on both sides of the main river channel over which the water was found to vary in depth from twelve to five feet.

The following table shows the maximum and minimum densities of the water observed from July 23 to August 28, 1907:

Oyster Bar.	Maximum Density.	Temperature.	Minimum Density.	Temperature.
Drum Point	1.0098	81° (F)	1.0088	83°
Marshy Island	1.0098	81°	1.0086	84°
Carmen	1.009	78°	1.007	81°
Georges	1.0088	78°	1.007	82°
Sandy Point	1.007	81°	1.0062	81°
Piney Island Swash	1.010	77°	1.0082	81°

By reference to the text and tables on pages 27-29 of Winslow's Report, it will be noted that the water over the Manokin River oyster grounds contained considerably more salt during August and September in 1878 than during July and August, 1907, the maximum density recorded from the "Lower Beds" in

1878 being 1.0152; the minimum over the "Upper Beds," 1.0128. The density of the water in all oyster-producing localities is influenced by the quantity of rainfall and therefore varies from season to season and from year to year. During the dry season none of the eleven tributaries of the Manokin River carries fresh water in sufficient quantities to affect the density over the oyster beds perceptibly, but during the spring or when the rainfall is heavy the discharge of fresh water from the marshes is probably large enough to lower the density of the entire river and the adjacent part of the sound.

Currents having a velocity of from .71 to .62 mile per hour were observed in the channel over *Drum Point* and *Georges* bars. Two series of observations made in the vicinity of *Sandy Point bar* during the maximum flow of two tides show that when the current runs with a velocity of .87 mile per hour in the middle of the channel it runs but .28 mile per hour near the edge of the channel and but .09 mile per hour over the mud flats in a cove near shore. On the opposite side of the river beyond the channel, but near a point of land which projects into the river the water flowed with a velocity of .59 mile per hour.

The bottoms which have been designated for crabbing aggregate an area of about 6,058 acres. Beginning at Hazards Point, on the south side of the river, they occupy a belt along the shore line to a point just below the mouth of Drum Point Creek, and a small area along the shore just above the mouth of Teagues Creek. On the north side of the river, all the bottom not occupied by natural oyster bars, from the mouth of Geanquakin Creek to the mouth of the river are crabbing grounds.

The survey of the oyster grounds and crabbing bottoms of Manokin River has resulted in opening but a small quantity of barren bottoms, adapted for oyster culture, for lease; much smaller, indeed, than was desired by even the oystermen who depend upon the public oyster grounds and crabbing bottoms for a livelihood. In addition to the lots leased for oyster culture under the former law and held under the present law, about fifty-two in number, the bottoms available for oyster culture are located;—between the crabbing ground, off the mouth of Cove Creek, and *Drum Point* bar;—in a narrow belt extending from

the mouth of Drum Point Creek, between the limits of the oyster bars and the shore line, to the head of the river;—from the head of the river above the limits of the oyster bars to the mouth of Geanquakin Creek. While much of this barren bottom is not adapted for oyster culture, about 300 acres can probably be made productive.

Nanticoke Sound.

Nanticoke Sound is the name used in this report to designate the waters below the mouth of the Nanticoke River which are included between the line[47] fixing the northeastern limit of the area set aside for scraping operations in Tangier Sound and a line connecting Nanticoke Point, in Wicomico County, with a point in Somerset County just below the mouth of Dames Quarter Creek.

The 1,046 acres of natural oyster ground located in the part of Nanticoke Sound belonging to Somerset County has, for economy and convenience in marking with buoys, been included within the limits of three natural bars.

The amount of soft barren bottom which might have been opened for leasing for oyster culture by buoying separately the small bars and lumps of which the present *Evans* bar is composed is not of sufficient area or value to warrant the cost of maintaining the buoys which would have been required.

The dotted portions on Charts 4a and 4b, reproduced on pages 158 and 159, give the approximate location and extent of the natural oyster grounds of this and the section next to be described, as they were found to exist in 1878 and in 1907. No depletion seems to have taken place in *Halls*[48] bar during this interval. On the other hand, it has improved both in condition and extent. Above *Halls* bar, however, a very large part of the area shown on Winslow's Chart as covered with oysters is now barren. The total area of the bottom in Nanticoke Sound

[47]This line runs between the point forming the southwestern extremity of Clay Island, in Dorchester County, and a point about mid-way between Haines Point and Halls Point on the Somerset County shore.

[48]*Hall's* bar of this report includes the bars described in Winslow's Report as *Horseys* and *Tylers* bars. *Rock Creek* and *Evans* bars are a small part of Winslow's *Middleground* and *Clump Point* beds.

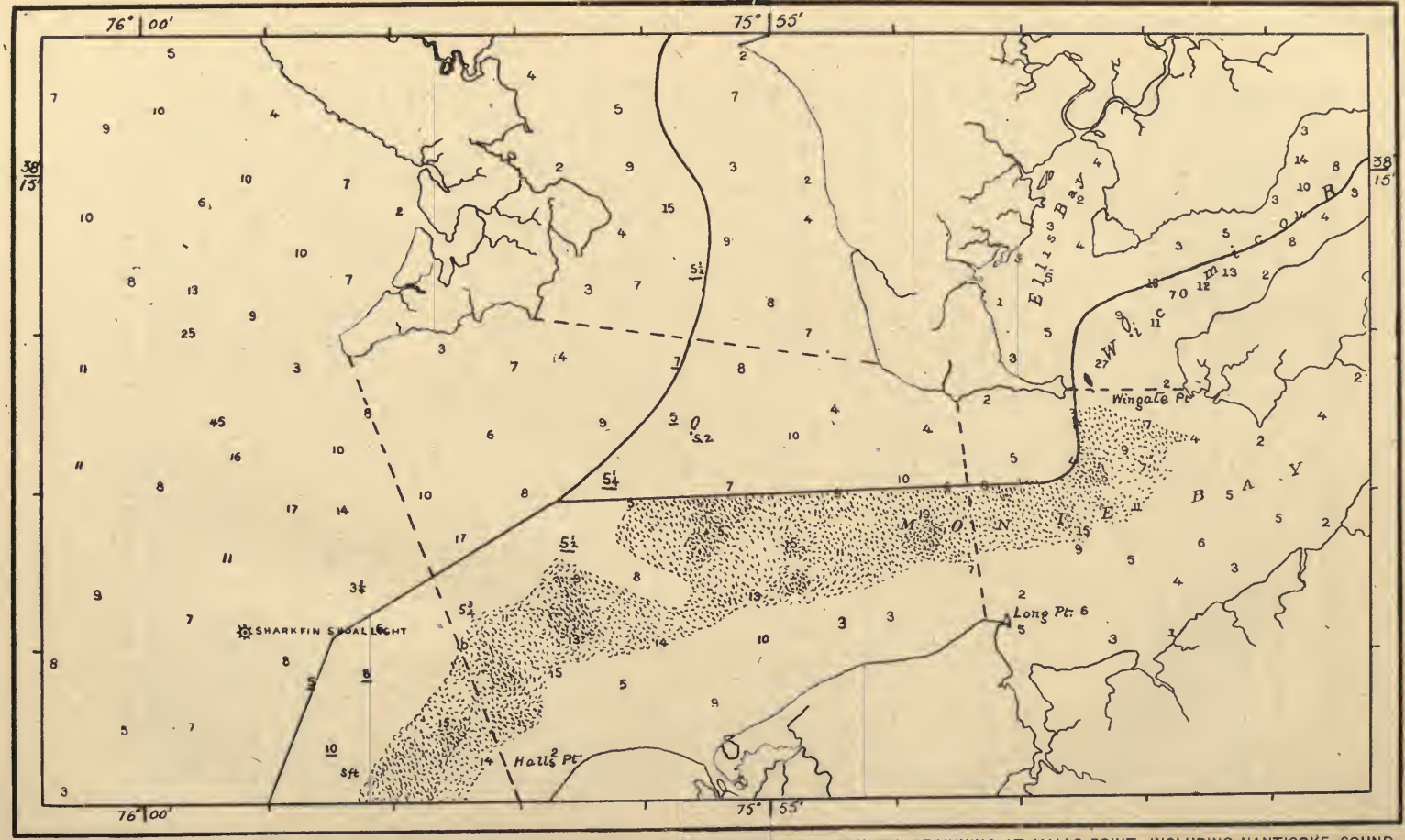


CHART 4 A—LOCATION AND EXTENT OF NATURAL OYSTER BARS WITHIN THE WATERS OF SOMERSET COUNTY, BEGINNING AT HALLS POINT, INCLUDING NANTICOKE SOUND, AND MONIE BAY, AS ASCERTAINED BY LIEUTENANT WINSLOW IN 1878.

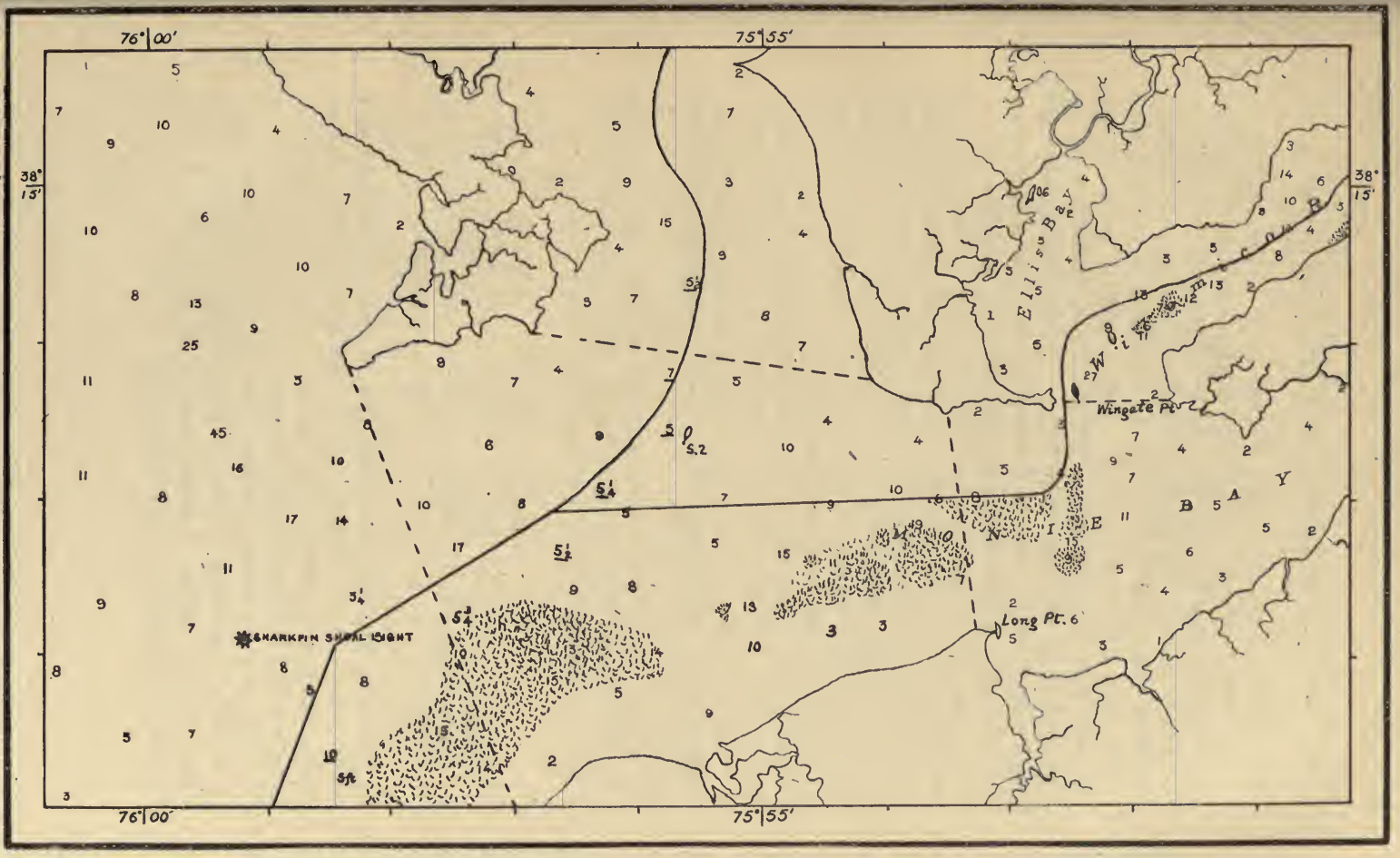


CHART 4 B—LOCATION AND EXTENT OF NATURAL OYSTER BARS WITHIN THE WATERS OF SOMERSET COUNTY, BEGINNING AT HALLS POINT, INCLUDING NANTICOKE SOUND, MONIE BAY AND WICOMICO RIVER, AS ASCERTAINED BY MARYLAND SHELL FISH COMMISSION IN 1907.

and Monie Bay, which was covered with oysters in 1878, as taken from Winslow's Report, is about 2,208 acres. The total area in the same territory in 1907 is 1,096 acres.

The bottom on the principal part of *Halls* bar and a small part of *Evans* bar is composed of sand or a mixture of sand with mud and is hard. Soft muddy bottoms occur on the greater part of *Evans* bar, on all of *Rock Creek* bar and on the outer and upper parts of *Halls* bar. Oysters grow in patches or "lumps" on the muddy portions of the bars, a continuous growth of oysters being confined to the hard bottoms.

The average depth of water over *Halls* bar is about 14 feet, 6-10 feet being found over the inner boundary, 19 feet over the lower end near *Haines* bar and 15 feet over the outer limits. *Rock Creek* bar is covered with water 10 to 13 feet and *Evans* bar with water 7 to 9 feet at its inner boundary and from 12 to 20 feet in the channel forming its outer boundary. The average depth over *Evans* bar, however, is not more than 12 feet.

The densities of the water over the oyster bars observed during the survey (September 6 to 13) are given in the table below.

A wide variation in the density of the water of Nanticoke Sound probably takes place during the year, due to the fact that the Nanticoke and Wicomico Rivers flow directly into it.

	Maximum Density.	Temperature.	Minimum Density.	Temperature.
Halls	1.0108	76°	1.009	77°
Rock Creek.....	1.0093	77°	1.0092	78°
Evans	1.009	74°	1.0082	74°

The mean rise and fall of the tide in Nanticoke Sound was found to be about 2.5 feet, with a maximum rise and fall of about 3.5 feet. Currents were observed to run with a velocity of .77 mile per hour over *Evans* bar.

No crabbing grounds were found in Nanticoke Sound and no ground has been leased for the purposes of oyster culture. There are about 100 acres of barren bottom off the mouth of Rock Creek which might be made productive.

Monie Bay.

The waters situated east of the line limiting the eastern boundary of Nanticoke Sound, and south of the line limiting the mouth of Wicomico River, are known in this report as Monie Bay.

The oyster-producing bottoms have been charted as one bar, containing 50 acres, to which the name of *Buoy* has been given. By reference to charts 4a and 4b on page 158, it will be seen that much of the ground which produced oysters in 1878 is now barren.

All gradations of bottom from hard sand to soft mud are found in the bar. Hard bottoms predominate, however, and are much more densely covered with oysters than those which are muddy. The depth of water over the bar varies from 9 to 15 feet. The maximum observed velocity of the flow in the channel was .65 mile per hour. On September 9th, the water had a density of 1.0072 and on September 13th, of 1.0094. The density fluctuates considerably with each tide, the ebb from Wicomico River carrying with it a considerable quantity of fresh water.

On account of the absence of crabbing ground in this bay the bottoms are available for lease for oyster culture, and 12 lots leased for this purpose under the former oyster culture law are now in use.

Wicomico River.

A line about three-quarters of a mile in length connecting the point forming the south-eastern extremity of Wicomico County with Wingate Point on the Somerset County shore, limits the mouth of the Wicomico River. Oysters will grow in the waters of the river to a point near White Haven, about five miles above the mouth, but no natural bar exists beyond Mt. Vernon wharf. The section of the river, falling within the limits of Somerset County, lies below the deep water channel and contains two natural oyster bars, covering an area of 58 acres. No comparison of the present condition of the oyster grounds with that in 1878 can be made since the survey carried on by Lieutenant Winslow did not extend beyond the limits of Monie Bay.

Wingate bar is situated in and near the channel just above the mouth of the river on a bottom composed of soft sand and mud. It is covered with water 7 to 12 feet in depth. *Mt. Vernon Wharf* bar occupies a position in the river similar to that of *Wingate* bar, but the bottom is composed chiefly of hard sand upon which there is a thin layer of soft sediment. The depth of water over the bar varies from 10 to 18 feet.

Currents having a velocity of 1.2 miles per hour flow in the channel of the river at certain stages of the tides. The density of the water over *Wingate* bar, when the tide was high, was 1.0088. A series of hourly observations of the density of the water over *Mt. Vernon Wharf* bar made on September 5th and 6th covering two tides shows a wide difference between the density at low tide and high tide, due to the fresh water brought down with the ebb. At high tide the density was 1.005, at low tide, 1.0028.

Some of the barren bottoms in the lower part of the river are adapted for the growth of oysters, but those in the upper part which were leased for oyster culture under the former oyster culture law have not been found sufficiently profitable to induce the owners to retain them. The growth of oysters in water as fresh as that in the upper part of Wicomico River is extremely slow.

Tangier Sound.

All waters situated north of the Maryland-Virginia boundary line, between Cedar Straits and Horse Hammock, and east of Smiths Island and South Marsh, including the waters of Kedge and Holland Straits, east of the Somerset County boundary line, but excluding the waters of the rivers, Sound and Bay previously described, have been designated by the County for scraping operations and are therefore considered in this report as the waters of Tangier Sound.

The oyster bars in this section, 13 in number, aggregate an area of 12,922 acres. By reference to the table on page 177 it will be seen that the condition of the natural oyster bars in Tangier Sound gradually improves as the distance between the bars and the Maryland-Virginia boundary line increases. The conditions of some of the bars near the State line is such that

the Commission would have been justified in refusing to exclude them from lease for oyster culture. They were charted and buoyed, however, as natural oyster bars because of their location near Crisfield, the home of hundreds of oystermen, and because they continue to be resorted to by these oystermen for a short period each season. That these bars do not now produce one-tenth the quantity of oysters of which they are capable and that their productiveness could be immediately increased ten fold under private ownership is the opinion of all parties concerned. There seems to be a general agreement also that the failure of these grounds to become restocked by nature is due to the fact that so much of their substratum of shells has been removed that an adequate amount of clean shell surface for the attachment of spat is lacking.

The approximate location and extent of oyster grounds in Tangier Sound as ascertained by the Commission can be seen by reference to the charts 2b, 3b, 4b, 5b, and 6b reproduced on pages 164 to 169.

In 1878 the quantity of oyster producing bottoms in Tangier Sound, according to the survey made by Lieutenant Winslow, covered about 25,792 acres or nearly twice the area now covered by natural oyster bars. The approximate location and extent of these oyster grounds as charted by Lieutenant Winslow, is shown on charts 2a, 3a, 4a, 5a, and 6a reproduced on the pages opposite the charts referred to above.

A comparison of the areas of the oyster grounds shown on these two series of charts by dotted areas indicates that while depletion of oyster bottoms has taken place to a certain extent in each of the sections of the Sound, it has been far more extensive in the sections south of a line from Hazard Point to Kedge Straits and in Kedge Straits, than in the sections above this line.

The demand for seed oysters by Virginia planters and the proximity of the oyster bars of the lower part of Tangier Sound to Virginia waters seem to be the only facts which can account for the depleted, and in some cases exhausted, condition of the oyster grounds in the section under consideration.

CHART 2 B—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN TANGIER SOUND FROM THE MARYLAND-VIRGINIA BOUNDARY LINE AS ASCERTAINED BY THE MARYLAND SHELL FISH COMMISSION IN 1907.

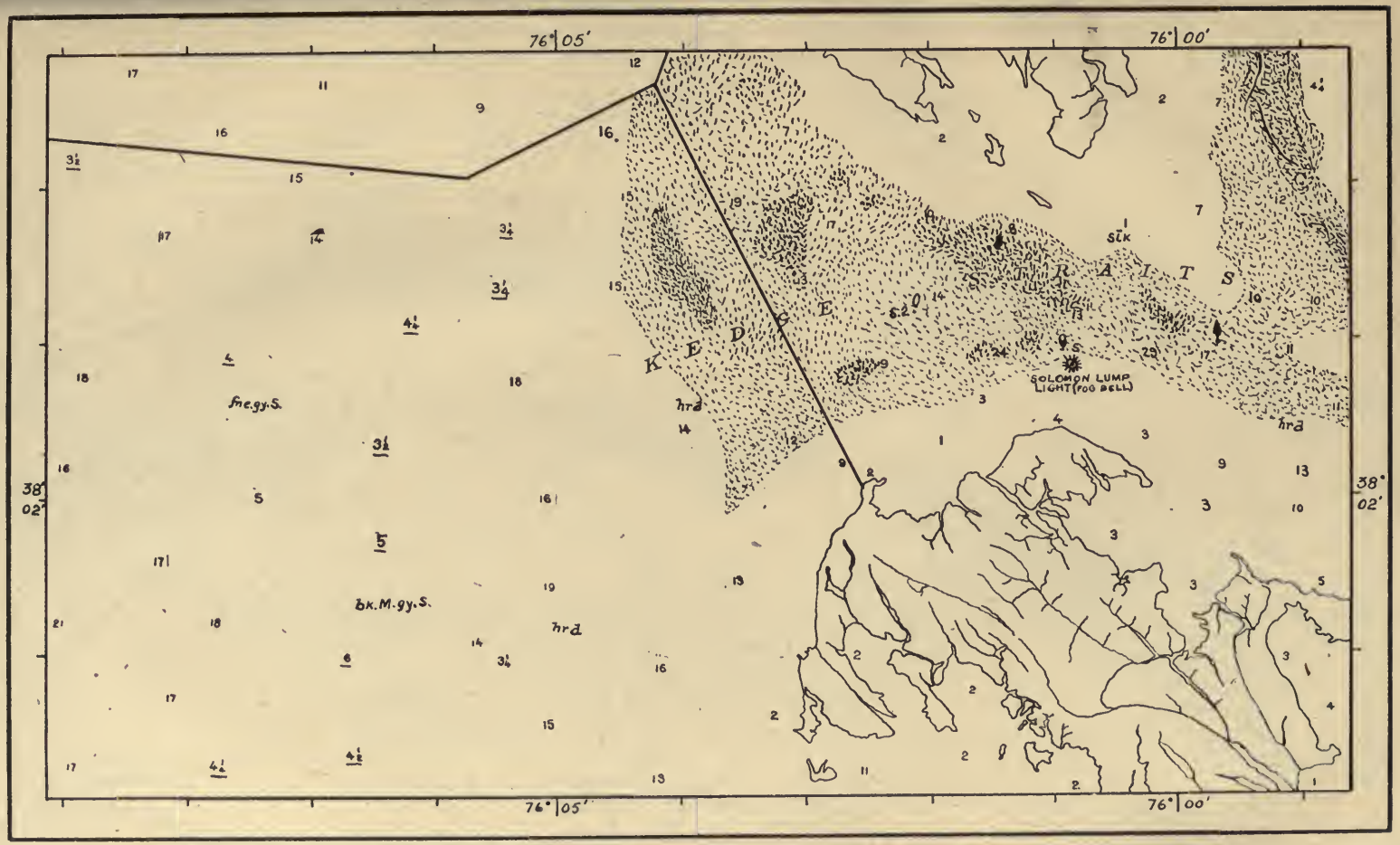


CHART 6 A—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN KEDGE STRAITS, AS ASCERTAINED BY LIEUTENANT WINSLOW IN 1878.

CHART 3 A—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN TANGIER SOUND FROM KEDGE STRAITS TO THE BOUNDARY LINE SEPARATING DORCHESTER AND SOMERSET COUNTIES, AS ASCERTAINED BY LIEUTENANT WINSLOW IN 1878.

CHART 3 B—LOCATION AND EXTENT OF NATURAL OYSTER BARS IN TANGIER SOUND FROM KEDGE STRAITS TO THE BOUNDARY LINE SEPARATING DORCHESTER AND SOMERSET COUNTIES, AS ASCERTAINED BY MARYLAND SHELL FISH COMMISSION IN 1907.

The Commission has been informed that it has been the custom of certain dredgers to continue to work these oyster grounds ofter the close of the oyster season, when the police boats are off duty, for the purpose of supplying Virginia planters with seed and that the material taken from the grounds at such times is not culled since the presence of shells among the oyster is not objected to by planters.

For the depths of water over the natural oyster bars and barren bottoms in Tangier Sound reference should be made to the charts soon to be published by the Coast and Geodetic Survey. (See page 7, footnote.)

Fox Island, Great Rock and *Philibys* bars form a wide continuous area on the eastern side of the Sound from the Maryland-Virginia boundary to Janes Island Light. Their eastern limit is situated on hard sandy bottoms in water varying in depth from 9 feet to 15 feet. Their western boundary extends into water 20 feet to 36 feet in depth. Hard sandy bottoms are found as a rule on the entire area, although patches of soft muddy bottoms are not uncommon especially on the parts toward the middle of the Sound.

Harris and *Piney Island East*[49] bars, situated below the mouths of Manokin and Big Annemessex Rivers, also form a continuous oyster producing area. The areas of hard sand and soft mud are about equal in extent, judging from the character of the bottom found at the numerous stations. The depth of water over the bars varies from 11 feet to 29 feet.

Prickley Point[49] bar lies just below the mouth of Manokin River on a bottom composed of hard sand in water from 10 feet to 18 feet in depth. It has been one of the most prolific areas in the Sound although now much depleted.

Piney Island West is situated west of the large sand bar which extends southward from Piney Island in the mouth of Manokin River. *Chain Shoal,* which lies east of Little Deals Island, would join *Piney Island West* but for the narrow channel which connects the Sound with Piney Island channel. The greater parts of these two bars are situated on the hard sandy

[49]Piney Island East and Prickley Point bars were included with the beds of Manokin River by Lieutenant Winslow.

bottoms on the eastern side of the main channel of the Sound but they extend to and include some of the soft bottoms in deep water. The depth of water over their eastern boundary varies from 6 feet to 12 feet, their western limits being covered 20 to 40 feet.

Mussel Hole, Turtle Egg Island and *Mud*[50] bars extend in a broad continuous belt on the western side of the Sound from a point opposite Solomon's Lump Light in Kedge Straits to the line dividing the waters of Somerset and Dorchester Counties.

The productive area of these bars seems to have been considerably more than doubled since the survey by Winslow in 1878. The limits of each have been greatly extended both on the west on the east. The bottom on the middle of the bars with the exception of a few sloughs is hard and sandy, but the oysters on the edges both east and west are scattered in lumps on soft mud.

Old Orchard and *Haines Point*[51] beds occupy an area on the eastern side of the Sound from a point just above Deals Island wharf to the line marking the boundary between Tangier and Nanticoke Sounds. These beds also have been about doubled in area since 1878, the process probably having been the same as that which has so greatly increased the productive area of the beds on the opposite side of the Sound;—scrapers carry shells and oysters beyond the limits of the bars as they dredge back and forth over them. The character of the bottom does not differ from that of the bars on the opposite side of the Sound. The depth of water over the inner boundary is from 6 to 12 feet; that over the outer boundary 20 to 27 feet.

The following tables show the density of the water observed from June 4th to September 12th, 1907, over each of the bars:

[50]In accordance with information given by the local assistants the names of *Turtle Egg Island* and *Mud* bars are reversed from Winslow's Report, the name *Turtle Egg Island* being given to the bar called *Mud* by Winslow and vice versa.

[51]The names by which Old Orchard and Haines Point bars are designated in Winslow's Report are *Cedar* and *Drumming Shoal.*

	Maximum Density.	Temperature.	Minimum Density.	Temperature.
Fox Island.....	1.0124	63°	1.012	63°
Great Rock.....	1.0124	64°	1.0118	66°
Philibys	1.0122	65°	1.0116	68°
Harris	1.013	81°	1.0094	83°
Piney Island, East...	1.0098	82°	1.0088	83°
Piney Island, West..	1.0108	79°	1.0094	80°
Prickley Point.....	1.010	82°	1.0094	82°
Mussel Hole.....	1.0109	79°	1.009	83°
Mud	1.0102	76°	1.0096	78°
Turtle Egg Island...	1.0108	78°	1.010	76°
Chain Shoal.....	1.0104	74°	1.010	79°
Cedar	1.0108	79°	1.0103	78°
Drumming Shoal....	1.0105	77°	1.010	77°

The maximum rate of flow of the currents in Tangier Sound are as follows: Over *Great Rock,* 1.09 miles per hour; *Piney Island East* and *Harris* bars, .85 mile per hour; *Piney Island West,* .97 mile per hour; *Chain Shoal,* 1.13 miles per hour; *Mussel Hole,* 1.21 miles per hour; *Mud* and *Turtle Egg Island,* .85 mile per hour; *Old Orchard,* 1.31 miles per hour and *Haines Point,* 1.21 miles per hour.

Observations of the tides were carried on from May 27 to June 29, 1907, at Janes Island Light, from June 16 to August 30, 1907, at Solomons Lump Light and from September 5 to September 30, 1907, at Great Shoals Light. While the object of the detailed results of these observations was for use in reducing the soundings made during the survey to the level of mean low water, some of the facts obtained are of general interest and are given below:

	Janes Island Light.	Solomons Lump Light.	Great Shoals Light.
Maximum range of tide....	3.6 feet	2.8 feet	3.4 feet
Mean range of tide.....	2. feet	1.8 feet	2.5 feet

Crabbing grounds aggregating an area of 15,944 acres have been excluded from lease in this section. They are situated in the following five localities: Around Smith's Island and in its various coves, creeks and thoroughfares; around South Marsh and in its coves, creeks and thoroughfares; west of Haz-

ards Point between the mouths of Big Annemessex and Manokin Rivers; south and west of Little Deals Island and west of Deals Island.

In Tangier Sound there are not less than 12,800 acres of bottom well suited to oyster culture not occupied by either natural oyster bars or crabbing grounds. This bottom includes about 5,200 acres pointed out for survey and examination by the local assistant, but which upon examination were found not sufficiently productive to be classed as natural oyster bars and about 7,600 acres of bottom not pointed out by the local assistant for survey and examination but which was included by Lieutenant Winslow in 1878 with the oyster producing areas of the Sound. The latter bottoms although productive in 1878 have long since ceased to yield oysters.

Practically all of these barren bottoms are situated south of a line drawn from the southern extremity of South Marsh to the southern extremity of Little Deals Island, no depletion having taken place in the oyster grounds north of said line.

In addition to the above mentioned exhausted oyster bottoms there are hundreds of acres of ground in the Sound which have never produced oysters so far as is known, but which could by proper treatment be made productive.

Chesapeake Bay.

The part of the Chesapeake Bay adjacent to Somerset County which has been surveyed and which will be opened for lease with said county, lies west of Smiths Island and Kedge Straits. It is limited on the south by the Maryland-Virginia State line; on the west by a line connecting Smiths Point, on the western shore just below the mouth of the Potomac River, with spar buoy "16," situated near the middle of the Bay about two miles north of a line connecting Holland Bar Light with Point Lookout Light; on the north by a line connecting spar buoy "16" with Holland Bar Light, and connecting Holland Bar Light with the nearest point of the Somerset County boundary line.

The oyster grounds pointed out by the local assistant in this vast area were but five in number. Their survey was conducted

from the Steamer Governor R. M. McLane, it being considered unsafe to undertake to run sounding lines in such bold waters so far from harbor with the Launch Canvasback. Owing to the difficulties under which this work was carried on, the number of lines across each oyster ground is not as great as might be desired, but they are sufficiently close together to enable the outlines of the oyster producing areas to be fairly accurately drawn.

Four of the grounds surveyed, covering an area of 5,458 acres, were found to be in a condition sufficiently productive of oysters to be placed in the category of natural oyster bars, but the remaining ground was so depleted that four oysters only were taken at 16 stations, five of which were examined with a dredge. No shells whatever were found at five of the places examined and but 17 shells at the remaining 11 stations.

Lieutenant Winslow did not carry his survey in 1878 far beyond the mouth of Kedge Straits and it is therefore not possible to compare the present condition of the dredging grounds in the section under consideration with their former condition.

In a section so located a very great fluctuation probably takes place in the condition of the oyster grounds from year to year. Shells completely covered at one time during storms may be again brought to the surface during succeeding storms and when again exposed quickly secure an abundant set of young oysters because of the conditions unusually favorable in the Bay for securing a set of spat.

The bottoms on *Church Creek, South West Middle Ground* and *Kedge Straits* bars are composed almost entirely of sand, and such bottoms are often shifted during storms especially in places depleted of shells and oysters. The bottom on the part of *Oyster Creek* bar nearest South Marsh is composed of sticky mud, but sandy bottoms are found on the off shore parts. *Church Creek* and *South West Middle Ground* bars lie west of Smiths Island, the first at a distance of about one mile, in water varying in depth from 15 to 22 feet, the second about 3.5 miles, in water 13 to 36 feet deep. *Kedge Straits* bar is situated about one-half mile southeast from Holland Bar Light, in water from 14 to 20 feet deep. *Oyster Creek* bar, a part of which

extends into the waters of Dorchester County, lies between *Kedge Straits* bar and South Marsh. It is covered by water from 7 to 19 feet in depth.

A limited number of observations on the velocity of the currents show that the water flows over these bars at certain stages of the tide at the rate of from .75 mile to 1.0 mile per hour. The density of the water during the month of June was:—over *Church Creek* bar, 1.008; *South West Middle Ground,* 1.0078-1.012; *Kedge Straits,* 1.008-1.0084; *Oyster Creek,* 1.0078.

During the summer the density gradually increased to 1.009 in August (over *Oyster Creek* bar), and during September to 1.0114 between *Kedge Straits* and *Church Creek* bars.

There are no grounds in this section of the Bay on which scraping for crabs is carried on.

The vast area of barren bottoms which are open for lease in the Bay are especially adapted for the production of seed oysters. (See page 182.)

NATURAL OYSTER BARS OF SOMERSET COUNTY

Number of Bar	Name of Oyster Bar	Date of Survey and Examination	Area of Bar in Acres as Buoyed	Area of Bar in Acres as Surveyed	Number of Corners	Number of Buoys	Average Number Oysters Per Sq. Yd. as Calculated From Records of Examination		Estimate of Average Number Bushels Marketable Oysters per Acre		Estimate of Total Number Bushels Marketable Oysters on Bar	
							Culls	Counts	Season of 1906-1907	Season of 1907-1908	Season of 1906-1907	Season of 1907-1908
		Areas Designated for Tonging Operations— Pocomoke Sound										
1	Kitts Creek, East	June 27, 1907	69	93.	5	5	2.5	1.8	26.4	26.4	1,768	1,768
2	Kitts Creek, West	June 27, 1907	27		4	4	3.2	2.2	32.3	33.8	839	878
3	Marumsco	May 29, 1907 June 17, 1907	612	592.	5	5	1.15	1.32	19.4	14.8	11,484	8,761
4	Gunby	June 17, 1907	237	220.	4	4	1.6	.39	5.7	13.6	1,254	2,992
5	Long	May 30, 1907	79	39.	3	3	.37	.13	1.9	3.3	74	128
6	Watkins	May 29, 30, 1907	302	315.	6	4	.47	.18	2.6	4.2	795	1,268
7	Stone	May 30, 1907	152	141.	3	1	.18	.66	9.6	4.5	1,353	634
		Big Annemessex River										
8	Big Annemessex	August 5, 9, 1907	1,212	1772	7	7	3.36	4.5	66.1	46.7	80,113	56,600
		Manokin River										
9	Drum Point	July 23, 25, 1907 August 1, 13, 1907	1,688	1754.	13	7	2.87	5.99	88.0	50.3	148,544	84,906
10	Carmen	August 13, 20, 1907	400	397.	9	5	3.78	4.13	60.7	47.9	24,097	19,016

11	Sandy Point	August 20, 1907	40	34.	5	3	4.2	6.3	92.6	61.7	3,148	2,097
12	George's	August 13, 20, 1907	580	544.	11	6	2.64	7.0	102 9	43.2	55,977	23,500
13	Marshy Island	July 23, 25, 1907 / August 1, 13, 1907	1,844	1834.	10	4	6 78	7 7	113.2	87 5	207,608	160,475
14	Piney Island Swash	August 1, 21, 28, 1907	950	824.	7	7	2.3	1.64	24.1	24.8	19,858	20,435
		Nanticoke Sound										
15	Hall's Point	Sept. 13, 1907	623	719.	6	4	13.1	11.4	167.6	151.5	104,414	94,384
16	Rock Creek	Sept. 13, 1907	9	22.	3	3	.35	2.2	32.3	13.3	290	119
17	Evans	Sept. 6, 13, 1907	414	254.	5	5	3.44	5.3	77.9	36.0	19,786	9,144
		Monie Bay										
18	Buoy	Sept. 6, 13, 1907	50	32.	4	4	26.1	18.1	266.2	280.6	8,518	8,979
		Wicomico River										
19	Wingate	Sept. 14, 1907	41	37.	4	4	.26	4.4	64.7	23.3	2,393	862
20	Mt. Vernon Wharf	Sept. 16, 1907	17	28.	4	4	6.0	2.7	39.7	57 3	674	974
		Areas Designated for Scraping Operations—Tangier Sound										
21	Fox Island	June 4, 1907	404	357.	4	2	1.3	1.0	14.7	14.3	5,247	5,105
22	Great Rock	June 4, 6, 1907	1.530	1396.	5	3	.37	.37	5.4	4.4	7,538	6,142
23	Philibys	June 6, 1907	*306	220.	4	2	.1	.31	4.5	2.2	990	484
24	Harris	July 24, 1907 / August 2, 1907	524	2602.	4	2	7.5	1.7	25.0	63.3	13,100	33,169
25	Piney Island, East	July 22, 24, 1907	952		4	2	.05	.96	14.1	5.0	13,423	4,760
26	Piney Island, West	August 2, 7, 21, 27, 1907	1,910	4946.	6	6	.12	1.16	17.0	6.6	32,470	12,606
27	Prickley Point	August 28, 1907	175		4	2	.23	1.15	16.9	7.2	2,957	1,260
28	Mussel Hole	August 8, 27, 29, 1907	2,039	1992.	6	6	.75	1.01	14.8	11.8	29,481	23,505

*Contains part of Old Island Bar.

NATURAL OYSTER BARS OF SOMERSET COUNTY

Number of Bar	Name of Oyster Bar	Date of Survey and Examination	Area of Bar in Acres as Buoyed	Area of Bar in Acres as Surveyed	Number of Corners	Number of Buoys	Average Number Oysters Per Sq. Yd. as Calculated From Records of Examination		Estimate of Average Number Bushels Marketable Oysters per Acre		Estimate of Total Number Bushels Marketable Oysters on Bar	
							Culls	Counts	Season of 1906-1907	Season of 1907-1908	Season of 1906-1907	Season of 1907-1908
29	Turtle Egg Island	August 29, 30, 1907	2,180	1788.	5	3	1.55	2.36	34.7	22.7	62,043	40,587
30	Chain Shoal	August 28, 29, 1907	672	556.	6	6	.44	1.56	22.9	10.8	12,732	6,004
31	Old Orchard	Sept. 10, 1907	389	327.	4	4	5.0	5.2	76.4	61.7	24,982	20,175
32	Haines Point	Sept. 10, 12, 1907	1,012	725.	6	4	8.2	4.4	64.7	86.7	46,907	62,857
33	Mud	Sept. 12, 1907	829	†1008.	5	3	11.0	6.7	98.5	113.6	81,656	94,174
		Areas Designated for Dredging Operations—Chesapeake Bay										
34	Church Creek	July 18, 1907	1,182	1032.	4	4	1.28			9 3		9,597
35	South West Middle Ground	June 28, 1907	3,015	2632.	4	4	3.1	.25	3.6	23.9	9,475	62,904
36	Kedge Straits	July 19, 1907	634	552	4	4	3.1	.3	4.4	24.2	2,428	13,358
37	Oyster Creek	August 7, 1907	627	644.	8	8	2.3	.4	5.8	18.8	3,636	11,787

†Part of mud bar lies in the waters of Dorchester County.

OYSTER CULTURE.

INTRODUCTION.

Development Gradual.

An industry in oyster culture such as is desired by advocates of the Haman Oyster Culture Law cannot be developed in a day.

The prejudices against oyster culture of those who depend upon the natural oyster grounds for a livelihood must be removed by demonstrating that an industry in planting on the barren bottoms need in no way interfere or conflict with the existing industry on the natural oyster bars, but that the two industries can be made to thrive independently side by side; that a demand for oysters throughout the Middle West can be easily developed, when the means of supplying it are at hand, such that the price of oysters will not be seriously affected by increasing the output from the Chesapeake many-fold but that the market, when thus enlarged will be more stable than under the present limited supply.

The interest of men with the necessary ability, energy and capital must be enlisted in the industry by demonstrating to them that the barren bottoms opened for lease by the State for the purpose of oyster culture are, when rightly managed, a valuable investment; that the present policy of the State to encourage oyster culture is not to be altered but that it is the determination of the State to grant every privilege and safeguard essential to the success of oyster culture not detrimental to the existing industry on the natural bars.

Time will be required to eliminate the prejudices which now hamper the development of the industry and to inspire such confidence in it as is necessary to place it upon a satisfactory basis.

Oyster Culture in Rhode Island.

In this connection it is interesting to consider the history of the now thriving and revenue producing industry in oyster culture in Rhode Island, an epitome of which is contained in the

table herein reprinted from the annual reports of the Commissioners of Shell Fisheries of the State. This table shows the gross receipts to the State for rent of oyster ground each year since the establishment of the office of the Commissioners of Shell Fisheries. It is seen from this table that the industry in oyster culture in Rhode Island did not become self-sustaining for several years, the expense of maintaining the Commission averaging about $4,000 per annum, but that its importance as a revenue producer steadily increased from the date of its establishment to the present time, 43 years after. The possibilities for oyster culture in a single one of the tidewater counties of Maryland are as great as those in the entire State of Rhode Island, but these possibilities are latent and will require time and labor for their development.

RECEIPTS FOR RENT OF OYSTER GROUNDS.

The following table shows the gross receipts to the State (Rhode Island), each year for rent of oyster grounds since and during 1864 at which time this office (Commissioners of Shell Fisheries), was established:

1864	$61.00	1886	10,433.00
1865	737.72	1887	8,648.00
1866	661.27	1888	7,614.00
1867	1,568.50	1889	9,997.00
1868	1,814.40	1890	5,616.20
1869	1,949.15	1891	12,595.70
1870	1,527.65	1892	6,731.55
1871	2,186.63	1893	6,491.25
1872	2,772.95	1894	6,675.55
1873	4,483.88	1895	6,509.00
1874	4,997.00	1896	6,569.57
1875	5,276.00	1897	7,016.74
1876	5,300.00	1898	7,690.00
1877	6,045.25	1899	13,558.46
1878	6,582.90	1900	20,973.08
1879	7,860.00	1901	25,767.38
1880	8,190.00	1902	36,843.96
1881	9,333.00	1903	42,160.02
1882	9,850.00	1904	44,499.25
1883	10,312.00	1905	47,082.26
1884	10,757.00	1906 (estimated)	59,305.56
1885	11,920.00		

Foundation of Prejudice Against Oyster Culture.

One of the deepest prejudices which exists at the present time among oystermen in Maryland against oyster culture can be traced directly to the failure of planters hitherto to recognize the natural division of labor which exists in oyster culture and the biological and physical conditions upon which these divisions depend.

Under the Five Acre Law many lots[52] were taken up for the purpose of oyster culture and the owners in many cases set about planting shells to secure a catch of seed oysters.

The lots taken up under this law were usually located on inshore areas in rivers whose waters do not flow swiftly and were *not therefore adapted to securing a set of seed oysters to planted shells,* although usually well adapted for *growing* oysters from *planted seed.* These planters from their continued failure to get satisfactory results by planting shells became convinced that oyster culture on barren bottoms is a failure and that the natural bars are alone adapted for producing oysters. This opinion being generally held among planters has convinced *oystermen* that planters do not want the barren bottoms and that this latest effort on the part of the State to encourage oyster culture is really an attempt to open the natural bars to lease.

Everyone should be convinced that some barren bottoms can be so managed as to produce oysters of a quality as fine and in quantities as great as the natural bars, by study of the conditions under which oyster culture is now thriving on the barren bottoms of other States. In Connecticut at the present time the amount of bottom under successful oyster cultivation is ten times as great as the total area of the natural bars of the State, and in Rhode Island there is an even greater difference between

[52]The use to which the greater number of the lots taken up under the Five Acre Law have been put is that of *bedding* oysters, an industry showing commendable enterprise and thrift on the part of oystermen, but one not to be classed as oyster culture. The object in bedding oysters is not to increase the number of oysters in the State, but to provide a convenient place to keep the oysters taken from the natural bars until they can be advantageously placed upon the market.

the area of planted barren bottoms and the natural bars. Oyster culture has been successfully developed in the barren bottoms in these States because after long experience and study, planters have learned to determine the purpose to which each barren bottom is especially adapted and have ceased to attempt to produce seed oysters on bottoms which are not suited for this branch of the industry. Had this fundamental fact been recognized by the Five Acre planters of Maryland, they would not have so underrated the value of the barren bottoms of the Chesapeake and its tributaries, and then the oystermen would not have had impressed upon them the entirely mistaken notion that oyster culture practically means the transfer of natural bars to private ownership. The object of the Haman Oyster Culture Law is to preserve the natural bars as well as to bring the barren bottoms under cultivation, thus greatly extending the industry and the opportunities of employment it affords.

BRANCHES OF OYSTER CULTURE.

In order to successfully develop an industry in oyster culture under the Haman Oyster Culture Law the mistakes which hitherto hindered its development must be avoided. The existence of the division of labor in oyster culture, referred to above, must be recognized and measures must be taken for putting this fact into practical application.

At least two distinct branches of the industry exist, each requiring different conditions for its best development and a third branch is sometimes recognized; the production of seed oysters; the growing of marketable oysters from seed and the fattening of matured oysters.

Seed Oyster Production.

By Section 111 of the Haman Oyster Culture Law provision is made for setting aside certain natural oyster bars from April 15 to May 15 for the purpose of supplying seed oysters to planters who have leased barren bottoms for growing oysters. By such provisions as this other States provide for the stocking of

private oyster grounds than the natural bars, and in following the same plan Maryland runs no risk in injuring the industry on the natural bars so long as the natural bars which are designated for supplying seed oysters for planting purposes are those only on which oysters do not as a rule grow to marketable size, but by so doing the risk is run of retarding and perhaps altogether preventing the development of one of the most lucrative branches of oyster culture, that of the production of seed oysters. Section 111 should not be repealed however until bottoms suitable for the production of seed oysters have been leased, and the Commission has recommended[53] that the "Lumps" near the head of the Bay be designated by special Act of the Legislature for supplying seed oysters to planters during the next two years.

Seed oysters *obtained from natural bars* are in every way *inferior* for planting purposes to those grown on *private grounds* and this fact is recognized by planters everywhere. Seed oysters from natural bars vary greatly in both age and size;—with the vigorous, young oysters there is always a certain per cent. of large oysters and old ones which are small because of stunted growth. These are usually very slow in adapting themselves to new conditions and are not therefore fit for planting.

Seed oysters produced on barren bottoms are of uniform age and size and can be transplanted at a period when they suffer least from the shock of rough handling and when the greatest increase due to subsequent growth is secured to the planter.

EXPERIMENTS.

Believing that the success of the Haman Oyster Culture Law depends largely upon the early development of an independent industry in seed oyster production and that the special value of the barren bottoms in certain localities for seed oyster production should therefore be demonstrated, the Commission selected lots in four localities open for oyster culture and planted shells on each during the early part of the summer just past.

---

[53]See page 200.

1. On June 27, 150 bushels of shells were scattered over a lot of ground in Tangier Sound containing .25 acre. The bottom is composed of hard dark-colored sand and is covered by fourteen feet of water.

2. On the same date a similar quantity of shells was scattered over a lot of the same size and with the same kind of bottom in the Bay about two miles southwest of Kedge Straits. The water over this lot is eighteen feet in depth.

3. On July 8, the third lot situated off Annapolis, between *Hackett Point* and *Tolley Point* bars on soft muddy bottom in water twenty feet in depth, was planted with 150 bushels of shells. It contains a little less than .25 acre.

4. The fourth planting was made on the same date as No. 3 on .25 acre of muddy bottom situated in water eighteen feet deep between *Tolley Point. Under the Gums* and *Thomas Point, North,* bars, 150 bushels of shells being again used.

The first planting was made on a lot situated on a depleted oyster ground over which the water does not flow swiftly, but the remaining three lots are situated on barren bottoms over which swift currents are developed with every tide.

On September 27, examinations were made of the shells planted on lots Nos. 1 and 2. Two attempts were made to examine the shells on lots No. 3 and 4 before this report went to press, but each time rough weather made examinations impossible.

Shells were tonged from three places on lot No. 1 and three pecks were examined shell by shell with the result that three young oysters only were found. The shells had not sanded, but were well above the surface of the bottom. Numerous calcareous worm tubes and patches of encrusting red sponge had become attached, but not in sufficient quantities to have prevented the attachment of young oysters had such been present.

Of the 190 shells (.33 bushel, standard measure,) collected from three places on lot No. 2, 145 shells (.25 bushel) had from one to ten young oysters per shell attached, 45 shells being without spat. On the 145 shells 386 young oysters, ranging in length from 1-16 inch to 1½ inches, were counted, or 2.6 spat per shell. According to the result of this examination, the

shells planted on this lot made a catch in three months of 1,158 young oysters per bushel or 1,544 per bushel when culled. This stock, just as it comes from the bottom, is of a quality such as sells in Connecticut for fifty cents per bushel.[54]

With reference to the date of shelling, character of bottom, depth of water, density of water, quantity of shells, method of planting and period of exposure the plants made on these two lots are exactly similar and the difference in the results cannot be referred to any of the conditions named. They differed in two important respects, however, and it is to these differences that the difference in the results is to be attributed. The water does not flow swiftly over lot No. 1, and in its course back and forth through Tangier Sound the water receives a comparatively small quantity of oyster spawn, due to the depleted condition of the natural oyster bars in the Sound. Over lot No. 2 very swift currents occur with each change in the tide and into each tide, from May to September, eggs are poured from untold millions of mother oysters living on the extensive and numerous untouched natural oyster bars located in the deep water from one end of the Bay to the other.

When the oyster embryos, developing from the eggs in the water, reach the stage in which they change from free swimming creatures to those adapted only to a sedentary life, they fall to the bottom. Minute oysters are probably precipitated throughout the breeding season in a continuous drizzle upon the bottom everywhere in the Bay, but all those not falling upon clean hard objects are lost. Over lot No. 1 the currents were not sufficiently strong to keep sediment washed from the shells, and such oyster fry as may have been deposited had little chance to become attached. A better catch would probably have been secured had the water been more frequently disturbed by storms. Over lot No. 2 the currents were strong enough to scour the surfaces of the shells during at least two periods each day and during these periods oyster fry found the shells in favorable condition for attachment.

[54]Since this report went to press it has been found that a demand for at least 100,000 bushels of such Chesapeake seed at 35 cents per bushel now exists in Chincoteague Bay.

The argument in the foregoing pages that bottoms in rivers and coves over which the flow of water is slow, are not favorably located for the purpose of securing seed oysters *seems* to be opposed by the *fact* that natural oyster bars exist in rivers and coves in perhaps greater number than in the Bay. A glance at the charts showing the location and extent of the oyster bars in Anne Arundel County is enough to show that nearly all the bottoms outside the channels in all the tidewater rivers are or have been the site of natural bars.

It must be remembered, however, that natural oyster bars have in every case been established very slowly—the cultch forming the basis for the bars having accumulated and become spread over larger and larger areas very gradually. The addition of a few young oysters here and there each year has been sufficient finally to build up a dense colony, but the length of time during which the building process lasted must not be lost sight of.

A planter having leased a barren bottom for oyster culture cannot afford to wait long for results. The expense incurred during a few years when the catch of young oysters to his exposed shells is small or none is too great to be covered by the good catch of spat he may now and then secure.

If there are grounds so located, whether in the rivers or in the Bay, that a good set of spat may be secured practically each season to exposed shells, much time and expense can be saved by utilizing them for the purpose of seed production only, transplanting the seed caught each season to grounds better adapted for growing oysters than for catching spat.

It is a fact known generally among oystermen that natural bars located at certain points in the Bay and at a few places in some rivers and sounds become set with young oysters much more regularly and thickly than others, and it is this fact which the Commission wishes to see applied to the barren bottoms now open for oyster culture.

Bottoms Adapted to Producing Seed Oysters.

Bottoms adapted to the production of seed oysters cannot always be selected according to any set rule because experience

will demonstrate the existence of bottoms here and there where oysters set regularly, the value of which could not have been predicted, the *one* necessary condition to the setting of oyster fry, if there is such, never having been discovered. The following statements, however, regarding the conditions under which to expose shells for securing spat will *generally* hold good:

The bottom selected should be somewhat elevated above surrounding bottoms and be free from the accumulation of sediment. It should be firm enough naturally or made so artificially to support shells at or above its surface. The water should flow over it at certain stages of the tide with a velocity sufficiently strong to free the exposed shell surfaces of any sediment which, during slack water, may have settled upon them. The proper condition of salinity and food supply must of course co-exist with the conditions mentioned above, but these factors may be disregarded, provided the bottom under consideration is located in an oyster-producing section. Even though the food supply in the water should be low, the lack in quality will be made up by the quantity which, through the rapid flow of the water, is available to the oysters. Good seed-producing bottoms are seldom found in the upper parts of rivers or in sheltered coves, but they abound in the Bay; near the mouths of rivers and along shores exposed to the action of high winds.

Growing Oysters for Market.

Oysters may be grown for market on the same grounds on which they become attached to cultch as spat, but oysters so grown do not sell for prices as high as those which have been transplanted one or more times. The conditions under which a set of young oysters is first secured are likely to bring about another set of spat the second season, a third during the next and so on, thereby producing badly shaped oysters adhering in bunches or clusters. The individual oysters of a cluster are not only badly shaped, but are more likely to be poor and of slower growth than oysters grown singly because the oysters of a cluster occupy the space that should be occupied by one oyster

and must divide the supply of food which should be available for one. By frequently dragging a heavy dredge, from which the bag has been removed, over bunchy oysters the bunches may be broken up and the oysters may thus be kept single, but the same result is more easily accomplished and at less expense by transplanting young seed oysters from seed grounds to grounds where conditions are not favorable for securing spat, but where seed oysters when planted are soon covered with a thin layer of sediment which excludes such oyster fry as might settle upon the oysters. Such a covering of sediment upon growing oysters, if not too thick, is of no disadvantage since it in no way interferes with feeding.

The belief that swift currents are necessary to the rapid growth of oysters is not well founded for although the amount of food available to an oyster depends upon the amount of water which flows by its mouth, the water of the Chesapeake and its tributaries is, in most localities, so rich in oyster food that a very small quantity (less than a quart), contains all the food needed per day by an oyster. The most sluggish currents are sufficient to provide this quantity of water for each oyster on a bar.

In support of this statement one need only be reminded that the water flows very slowly over some of the best natural oyster bars in the State. In selecting grounds for growing oysters, therefore, swift currents should be avoided. They should not be especially elevated above surrounding bottoms and should, if possible, be located in the immediate vicinity of mud flats, for these constitute rich food-producing centers. Grounds offering these conditions are usually found on the in-shore areas of rivers and the Bay. Most of the lots leased under the five-acre law are well adapted to growing oysters.

Fattening Matured Oysters.

It very often happens that oysters do not become fat on their native bottoms at the time they should be marketed and on some good growing ground oysters seldom or never fatten. The lessees of such bottoms should have ground especially adapted

for fattening oysters to which they may transplant their stock before placing it on the market. That there are such fattening grounds here and there in the Bay and its tributaries is a well-known fact, but their location can be determined by experience alone. Rapid fattening depends upon the richness of the food supply and the number of oysters on the bottom. The richness of the food supply in any locality fluctuates from season to season, but the density of oysters on the bottom can be regulated by the planter.

PHYSICAL AND BIOLOGICAL INVESTIGATIONS.

OBJECT AND SCOPE.

It is reasonable to expect that barren bottoms which duplicate, or which by artificial means can be made to duplicate, the essential physical and biological conditions found to exist on productive natural bars, will produce oysters under private supervision and ownership.

On the other hand, it is not reasonable to expect barren bottoms which lack even one of the conditions essential to the growth of oysters to be valuable as an investment for oyster culture.

The following lines of investigation concerning the physical and biological conditions under which oysters grow naturally in Maryland have therefore been undertaken, in connection with the survey of the natural oyster grounds, with the expectation that the results obtained can be made of practical use to prospective planters in selecting barren bottoms for planting purposes:

1. Character of the bottom.
2. Depth of water.
3. Velocity of currents.
4. Density (salts contained) of the water.
5. Organisms used by oysters as food.
6. Quantity of oyster food in the water.

METHODS.

Character of Bottom.

The character of the bottom includes its composition and hardness. It is roughly determined at each of the survey soundings with the lead line and more accurately at each of the examination stations from the material brought up by the tongs. The findings are recorded in the following terms: Very

soft mud, soft mud, sticky sandy mud, hard muddy sand, hard clay, very hard sand, shifting sand, and gravel.

A probe with which to ascertain the depth of the bottom and the composition of its deeper strata has not been used because of the necessity for speed in making the examinations, but accurate tests of the hardness of the bottom of a few characteristic natural oyster grounds are being made, with an apparatus designed for the purpose by Dr. H. F. Moore, in order to establish a standard by which to gauge the fitness of barren bottoms for oyster culture.

Depth of Water.

The depth of water is taken at each sounding and at the examination stations. As the depth varies with the tide at any point, each observed depth is reduced to mean low-water level before it is plotted on the charts. The Coast and Geodetic Survey, having established "bench marks," marking the level of mean low water, at several points on the Chesapeake, the reduction of the soundings is easily made. A daily record is kept at some point, such as a light house, within the region being surveyed, showing the variation of the tide at every hour, from the level of low mean water. A record of the exact time when all soundings are made is also kept on the survey and examination boats. By adding (or subtracting) the variation of the height of the tide from the level of mean low water, observed at the time the soundings were made, to the depth of each sounding, the actual depth of each sounding at mean low water is obtained.

These soundings are not all published at this time, but the charts, published by the Coast and Geodetic Survey, showing the results of the survey, have the 6-foot, 18-foot and 30-foot curves plainly delineated. The average depths of water over each of the natural bars are given in the part of this report in which the oyster grounds are discussed.

Velocity of Currents.

The observed maximum velocities of the currents are also given in the general description of the oyster grounds. These observations were begun after the survey had been in progress for some time and are not as complete therefore as desired.

The apparatus for measuring the velocity of the currents consists of a cylinder of light wood, six feet in length, so weighted with lead at one end that, when placed in the water, it sinks to a depth of 5½ feet. A light line, graduated at 25, 50 and 100 foot intervals, is fastened to a staple, near the end of the pole projecting from the water. When the examination boat is anchored and has swung with the current, the pole is placed in the water and, as it is carried with the current, note is made of the time required for it to travel 50 or 100 feet. From this record the velocity of the current in distance per hour is calculated.

Density of the Water.

The density or salinity of the water over each of the oyster grounds surveyed has been tested on as many occasions and under conditions as different as was possible during the survey. The results are published with those relating to currents and bottoms.

The density of sea water indicates the amount of salts contained. Fresh water contains no salts and is taken as the standard for all density (specific gravity) measurements. The apparatus used to determine the density of salt water consists of a series of three sealed glass bulbs, each weighted at the bottom and ending above in a slender, hollow stem containing a graduated scale. The scale in the stem of bulb No. 1 reads downward from 1.000 (the density of fresh water) to 1.011; No. 2 from 1.010-1.021, and No. 3 from 1.020-1.031. The weight of No. 1 is just sufficient to cause it to sink in *fresh* water until figure 1.000, on the scale, stands at the level of the surface of the water. The more salt the water contains the higher the bulb floats, the density being indicated by the figure appearing

at the water's surface. In pure sea water the amount of salts is sufficient to float bulb No. 3 at about 1.026. Bulb No. 1 is used to determine the density of brackish water, while No. 2 serves to indicate the density of water between brackish and salt.

The density of water is, to a small degree, affected by temperature, it being less when the water is warm. For all practical purposes, however, this error may be disregarded and, in the density records published, no correction for temperature has been made. The temperatures of all samples have been recorded, however, and are on file.

The Food of Oysters.

Oysters from the natural bars and specimens of water from near the bottoms, immediately above the bars, have been systematically collected and examined with reference to the organisms constituting the food of the oyster and with reference to the quantity of this food in the water.

Minute organisms of numerous species literally fill the water of the Chesapeake Bay and its tributaries, some of which are of value to the oyster as food, others not. By opening oysters from bars in various localities, removing the contents of their stomachs, with a medicine dropper, and examining the contents with a microscope, those organisms which constitute the food of the oyster in each locality can be identified. Such material has been collected and preserved from numerous localities in Anne Arundel and Somerset Counties, and will be collected from each locality as it is surveyed.

Knowing which organisms, found in the water of a certain locality, are valuable as food for oysters, all other kinds occurring in the specimens are ignored in the examinations and excluded from the estimates of the food value of the water.

The method of collecting specimens of water and preparing them for examination is as follows: The launch *Investigator,* having been anchored at a flag buoy preparatory to making an examination of an oyster bar, a water cup, holding a little more than one quart, is lowered to the bottom and filled. The water is emptied into a flask such as is shown in figure 11, and note is

made of the locality, date, depth, kind of bottom, density and condition of the sample. To the sample 20 cubic centimeters of formalin is added to prevent the decay or further growth of the organisms contained. It is then allowed to stand for twenty-four hours or more to settle.

The cup used to collect specimens of water is so constructed that it remains closed until it rests upon the bottom. The water flows in at the valve in the top which stands at a level one foot above the bottom. It would be more satisfactory could the sample be collected nearer the bottom than one foot, but experience has shown that when collected at a lower level a considerable quantity of sediment, stirred up by the contact of the cup with the bottom, is included, and this interferes with the examination of the specimen.

When the organisms contained in a sample have settled to the bottom of the flask the clear water above is siphoned away and the residue, usually amounting to about 200 c. c., is emptied into a smaller flask, Figure 11. This is again allowed to settle and the clear water is siphoned away, reducing the residue to a volume equal to about 20 c. c., which is placed in a small bottle, Figure 11, properly labeled and filed. The food material in the sample is thus concentrated to a bulk convenient for examination.

A specimen when examined microscopically is first reduced in quantity to exactly 20 cubic centimeters. After thoroughly shaking the specimen one cubic centimeter is removed, before it has time to settle, with a graduated pipette and placed in a "Rafter Cell," Figure 11.

A Rafter Cell is an apparatus holding one cubic centimeter of liquid, so made that the liquid is spread over a surface of 1,000 square millimeters to a thickness of one millimeter. With this apparatus it is possible to count the actual number of organisms in an accurately measured part of a cubic centimeter of water. Such counts from two or more cubic centimeters of each specimen are made and used as a basis for estimating the total quantity of food organisms in the entire specimen.

From the examinations made thus far the number of organisms available to oysters as food over the natural bars in Anne Arundel County, is calculated to be from 20,000 to 100,000 per

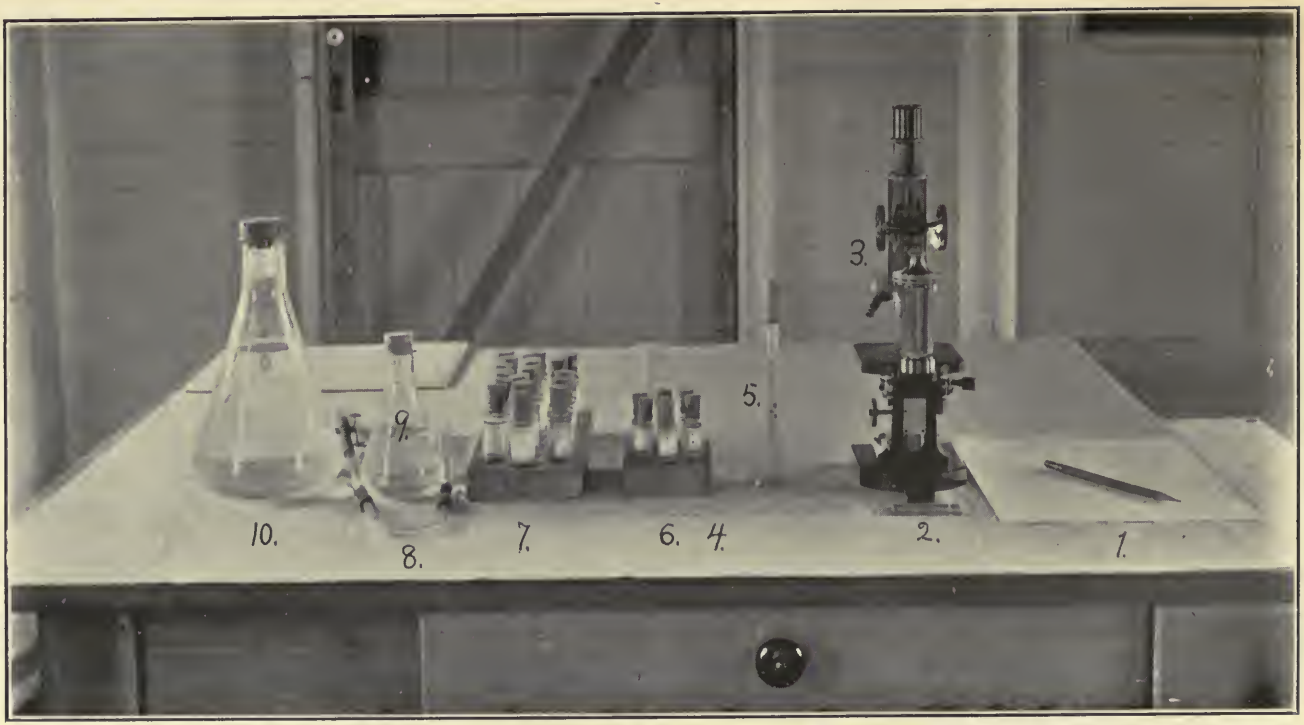


FIG. 11.

PHOTOGRAPH SHOWING APPARATUS AND METHODS FOR INVESTIGATING FOOD SUPPLY OF OYSTERS IN THE TIDEWATERS OF MARYLAND.
(FOR DESCRIPTION, SEE TEXT.)

liter of water, but on account of the incompleteness of this work, and for other reasons given further on, all results from this line of investigation are withheld from this report.

VALUE OF FOOD INVESTIGATIONS.

The minute organisms, forming the food of the oyster, follow the same laws of distribution observed to regulate that of larger organisms such as fishes and land animals; different species inhabit different regions and the individuals of one species may be numerous in one locality at one time and be almost totally lacking at another. Since the value of an oyster ground depends very largely upon the supply of oyster food in its immediate locality and upon the stability of this supply, it is readily seen that any line of investigation which develops a knowledge of the food value of the Chesapeake is valuable for oyster culture.

The number of oysters a given bottom will maintain depends upon the amount of food available in the water and the rapidity of the flow of the water. Some of the most valuable oyster bottoms, such as those in Lynnhaven Bay,[55] will not produce oysters in great quantities on account of the poor feeding conditions of the locality, their special value depending upon the shape and flavor of their product. If stocked with a quantity of oysters above their capacity such grounds prove a failure.

It is hoped and confidently believed that when a series of investigations of the food supply of different localities of the Chesapeake Bay, which are planned by the Commission, have been carried out, covering a period of two or more years, the Commission will be in a position to give fairly accurate estimates, after careful examinations of barren bottoms, of their special fitness for oyster culture, including the quantities of oysters per acre they will maintain.

No investigations of exactly this kind have ever been made and they may be found less practicable than appears, but they

[55]The best grounds in Lynnhaven Bay will support but 150 bushels of oysters per acre and much of the bottom will support but 50 bushels per acre.

are well worth the small cost of carrying them on. The plan for completing these investigations is as follows:

A STANDARD TO BE ESTABLISHED.

No practical value can be attached to the result of a single examination of the food contents of the water of a locality or to the results of a series of examinations covering but a short period of time, because the food value of the water of every locality changes more or less with the seasons. A *standard* food value to be obtained by making numerous examinations of the water over certain natural oyster bars, the value of which for oyster production is known, covering every month for a series of years, is needed to which to refer all isolated examinations. Having such a standard of food value of water with which to compare the results of examinations of the food contents of water from localities where barren bottoms are situated, it should be possible to ascertain not only that such bottoms will or will not be valuable for oyster culture, but also the quantity of oysters they will support per acre.

It is proposed to establish such a standard for the food value of the waters of the Chesapeake by making systematic examinations of the water above natural oyster bars in the following localities, three of which are on the Western and three on the Eastern Shore:

Hackett Point.
Holland Point.
Patuxent River.
Tangier Sound.
Poplar Island.
Love Point.

A standard of sufficient accuracy for practical use will not have been established for at least two years, and it has been thought best, therefore, to withhold all results of the examinations of the food contents of the water thus far made from this report.

The value of the bottoms at Hackett and Holland points and in Tangier Sound, in terms of the quantity of oysters they now produce, is known from the results of the examination made

during the survey (see table, page 140), and as the survey progresses the value of the grounds in the other localities selected will be ascertained.

The quantity of oysters on a natural bar at any time depends entirely upon natural causes and is frequently below that which the water over it would support (Bars in Tangier Sound) and sometimes, after a good set of spat, it is above that which can be maintained in marketable condition (Hackett Point Bar). It is therefore desirable to ascertain the food value of the water in certain localities outside the State, such as Lynnhaven Bay in Virginia and Great South Bay in New York, to add to the table of standards, for since planting has been carried on in these localities for some time the quantity of oysters their waters will support is accurately known.

RECOMMENDATIONS.

SEED OYSTERS.

On March 28, 1907, in accordance with the provisions of Section 111 of the Haman Oyster Culture Law, the Commission passed an order designating the section of the Bay containing a part of the public oyster grounds, known as "The Lumps," for the purpose of supplying seed oysters to persons engaged in planting or cultivating oysters on grounds leased for this purpose from the State, and prescribing such regulations as were deemed necessary to prevent the oysters taken from the section designated, during the period from April 15-May 15, being sold or used for purposes other than planting on bottoms leased from the State.

This order was communicated to the Board of Public Works on April 5, with a request that the Commander of the State Fishery Force be instructed to detail one or more police boats to patrol the waters of the section designated to prevent violations of the provisions of the order.

In designating a police boat to patrol the waters of the section set apart for taking seed oysters for planting purposes, the Commander instructed the captain of the police boat to see that the provisions of the Cull Law were not violated by those who resorted to the section for the purpose of securing seed oysters.

As a result of these instructions, upheld by an opinion of the Attorney General rendered May 2, the object of the order passed by the Commission was defeated and no seed oysters were secured by planters from the section designated.

The Commission, prior to passing its order, studied the seed-oyster question carefully and, in designating the section containing "The Lumps" for the purpose of supplying planters with seed oysters, it is of the opinion that it not only acted within the bounds of the authority conferred upon it by the Haman Oyster Culture Law, but that in its action no injury whatever was inflicted to the interests of those who depend upon the natural oyster bars of the State for a livelihood.

According to reports by dredgers familiar with the condition of "The Lumps" at the time the order was passed, an abundance of oysters under 2½ inches in length were to be found, with but a very small proportion of marketable oysters among them.

It is the opinion of the Commission that the section of the Bay under consideration is one in which the quantity of oysters which grow to marketable size will never be large, although one in which small oysters will frequently be exceedingly numerous. This opinion is based upon the testimony of persons who have long been familiar with conditions as they have existed in the past on "The Lumps" and upon conditions as they now exist and are likely to exist in the future. During the spring when the Susquehanna and other rivers at the head of the Bay pour a volume of fresh water into the Bay such that the water over "The Lumps" becomes fresh and remains so for several days, many of the oysters in that section are killed. Freshets of such duration as to kill oysters, while not of regular annual occurrence on "The Lumps," are sufficiently frequent to prevent the growth of mature oysters in abundance.

The condition of the shells on these bottoms and the velocity of the tidal currents over them during the oyster spawning season are such that an abundant set of young oysters takes place each year.

In view of these conditions and the fact that until an industry in raising seed oysters has been developed in the State,[56] those who lease ground from the State for the purpose of cultivating oysters need small oysters with which to seed their grounds, the Commission recommends that its former order, printed below, be made operative.

ANNAPOLIS, MD., March 28, 1907.

It is ordered by the Board of Shell Fish Commissioners of Maryland, this 28th day of March, 1907, that pursuant to the provisions of Section 101 of Chapter 711 of the Acts of Assembly of 1906, the following area is set aside for the purposes mentioned in Section 111 of said Act, that is to say, all that part of the Chesapeake Bay lying beyond the territorial boundaries of the respective tidewater counties adjacent thereto, which is situated north of a straight line drawn from the point on the Western shore of the bay, known as Bodkin Point, to a point on the Eastern shore of the bay, known as Swan Point, excluding the whole of Swan Point bar.

---

[56]See page 182.

REGULATIONS.

1. Any tongman licensed for the oyster season of 1906-1907 may tong, between the 15th day of April and the 15th day of May, 1907, for oysters in the above mentioned area. The oysters so tonged shall be culled within the area hereby set aside for the purpose of excluding all shells, which must be thrown overboard within said area upon the natural rocks from which they were taken. All oysters valuable for planting purposes, however, may be removed or taken during the period aforesaid whether above or below 2½ inches in length.

2. No boat shall be permitted to leave the area above mentioned with a cargo, or part of a cargo of oysters, on board, unless the captain, or other person in charge of the same, shall exhibit to the commander of the police boat patrolling the said area, a contract of purchase for the oysters so mentioned, signed by one or more of the lessees of land in the State of Maryland leased for oyster culture under the provisions of Chapter 711 of the Acts of 1906. A list of said lessees shall be furnished by the Clerk of the Shell Fish Commission to the commander of the police boat, or boats, patrolling said area.

3. No boat having a dredge or scrape on board shall be allowed to take oysters in the area above mentioned.

ACREAGE OF LOTS FOR LEASE.

The Commission holds the opinion that, after the natural oyster bars and crabbing bottoms have been surveyed and charted and thus excluded from lease, the interests of oystermen and crabbers will not be placed in jeopardy by increasing the acreage of barren bottoms which may be leased for the purposes of oyster culture, and it therefore recommends that the area which may be leased for this purpose in the territorial limits of the counties be increased to 50 acres and in the waters beyond the territorial limits of the counties to 500 acres.

Oyster lots of the acreage now allowed if located near shore can be cultivated and protected without great expense to lessees, but if located in the open waters of the Bay and sounds, large seaworthy boats will be required for the work of both planting and policing and the cost of such boats and the expense of equipping and maintaining them is so great as to make oyster culture on a small scale in such localities unprofitable.

The above recommendation is based upon the fact just stated and the further fact that much of the bottom suitable for oyster culture thus far opened for lease is located in the bold waters of the Chesapeake Bay, Rocomoke and Tangier Sounds.

DREDGING ON LEASED LOTS.

Section 112 of the Haman Oyster Culture Law has been interpreted to mean that dredging or scraping operations cannot be carried on on lots leased for oyster culture situated in districts designated for tonging operations, but that planted oysters in such districts can be removed with tongs only.

Much of the barren bottom in Anne Arundel and Somerset counties best adapted for oyster culture is located in districts set aside for tonging operations and will not be leased for oyster culture until planters are unrestricted in the methods to be employed in planting and cultivating oysters.

Tonging operations, as a method of removing oysters from the bottoms on which they grow, are very slow, as may be seen by reference to the part of this report (page 65), in which the areas are given which it is possible for tongmen to cover during a period of one hundred days of eight hours each, and it cannot be expected that planters will lease bottoms for oyster culture when the entire amount of time which is available for the work of planting and cultivation is needed for gathering oysters. Planters should be able to place their oysters on the market when prices are best and when their oysters are in marketable condition and this cannot be done when tonging is the only method by which they may be gathered.

The objection raised by oystermen against permitting the use of scrapes or dredges on private grounds in tonging districts is that planted grounds situated near natural oyster bars will be made bases from which illicit dredging operations will be carried on on the natural bars. This objection rests upon well-founded fears, many oystermen having signified their intention to lease lots with the object of so using them.

Believing, however, that the methods of oyster culture may be unrestricted and oyster culture thereby made possible without injury to the interests of tongmen, the Commission recom-

mends that the right to plant, cultivate and gather oysters from lots leased in any part of the State, by any means whatsoever and at any time whatsoever, be granted, and that severe penalties be provided for dredging or otherwise taking oysters by planters beyond the limits of their private lots.

MAINTENANCE OF STATE BUOYS.

Section 86 of the Haman Oyster Culture Law provides that State buoys be placed at the corners of the natural oyster bars in order that oystermen may see that all natural bars have been surveyed and charted and permanently excluded from lease for oyster culture.

Since oystermen are in no need of buoys to mark the location of the oyster bars to which they resort, the State buoys placed at the corners of the natural bars cease to be of practical value to oystermen when the period, after the charts have been filed, during which appeals in accordance with Section 91 can be made to the Circuit Court, from the action of the Commission, has elapsed.

The State buoys can be maintained only at an annual expense almost equal to their original cost (see page 128), for very few of those which are carried away can be recovered and, without careful and regular attention, the life of those which are not carried away is not more than two years.

The Commission recommends that buoys be placed at the corners of all natural bars after they have been surveyed, as now provided, but that these buoys be not maintained longer than a period of four months, dating from the filing of the charts.

ASSISTANTS APPOINTED BY COUNTY COMMISSIONERS.

The Commission recommends that the County Commissioners of each county in which there are natural oyster bars yet to be surveyed be authorized, upon request by the Commission, to appoint a resident from each tidewater district of said county, familiar with all the natural oyster bars and crabbing bottoms

of his district, to go with the Commission during a survey of said district to point out the approximate location of the natural bars and crabbing bottoms.

This recommendation is made because experience has shown that it is not possible for one individual to know the location of all the natural oyster bars within the limits of a county. A failure on the part of the Commission to survey and chart some of the oyster bars is less likely to result should an assistant from each district be appointed.

EXHIBIT AT JAMESTOWN.

An exhibit to call attention to the oyster resources of Maryland and the plan by which the State proposes to encourage the development of an industry in oyster culture, was prepared by the Shell Fish Commission and placed in the Maryland Booth in the State's Building at the Jamestown Exposition. Due to the small amount of space allotted to the exhibit, it was necessary to place many of the charts so high above the floor that they could not be examined by visitors. The following is a list of the exhibits:

1. A glass case containing:
   (a) Three large oysters dissected to show the structure of the oyster, photographs of which are reproduced in this report on pages 207 to 210.
   (b) A cluster of oysters illustrating the effect of soft muddy bottoms upon the growth of oysters.
   (c) A series of specimens taken from hard bottoms showing oysters of different sizes and ages.
   (d) Some of the enemies of the oyster.
2. Five framed diagrams, 3 feet by 3 feet, showing the average number of small and large oysters per square yard on:
   (a and b) Hackett Point bar, Anne Arundel County.
   (c) Trolley Point bar, Anne Arundel County.
   (d) Bay Shore bar, Anne Arundel County.
   (e) Outer Magothy bar, Anne Arundel County.
3. A large oil painting, 5 feet by 4 feet, showing the equipment for and the method of conducting the survey of the oyster grounds. A photograph of this painting forms the frontispiece for this report.
4. Two framed "boat sheets" showing the results of the survey of the oyster grounds in:
   (a) Herring Bay, Anne Arundel County.
   (b) South River, Anne Arundel County.
5. Two framed "smooth projections" showing the natural oyster bars in:
   (a) Herring Bay, Anne Arundel County.
   (b) South River, Anne Arundel County.
6. Five framed charts published by the Coast and Geodetic Survey showing the results of the complete survey of Anne Arundel County waters.

FIG. 12.

OYSTER.
RIGHT SHELL REMOVED.

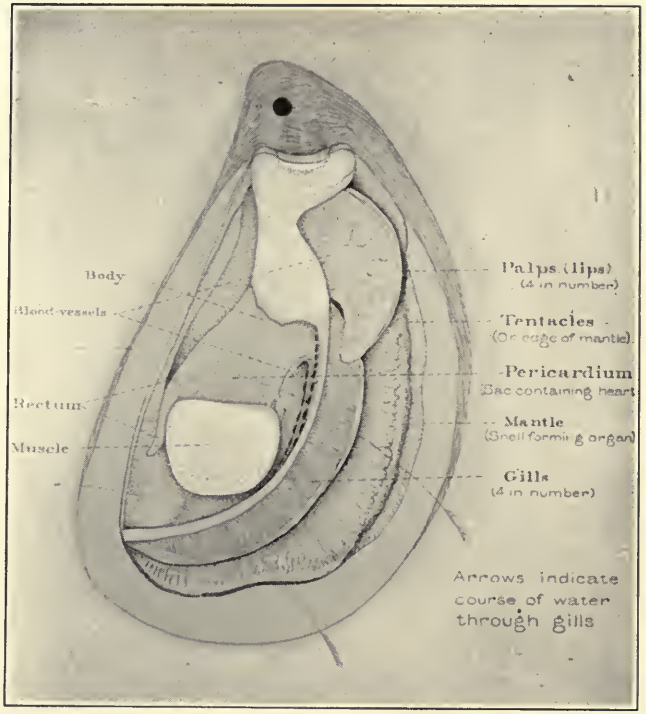


FIG. 13.

OYSTER AND SKETCH.

RIGHT SHELL AND MANTLE REMOVED.

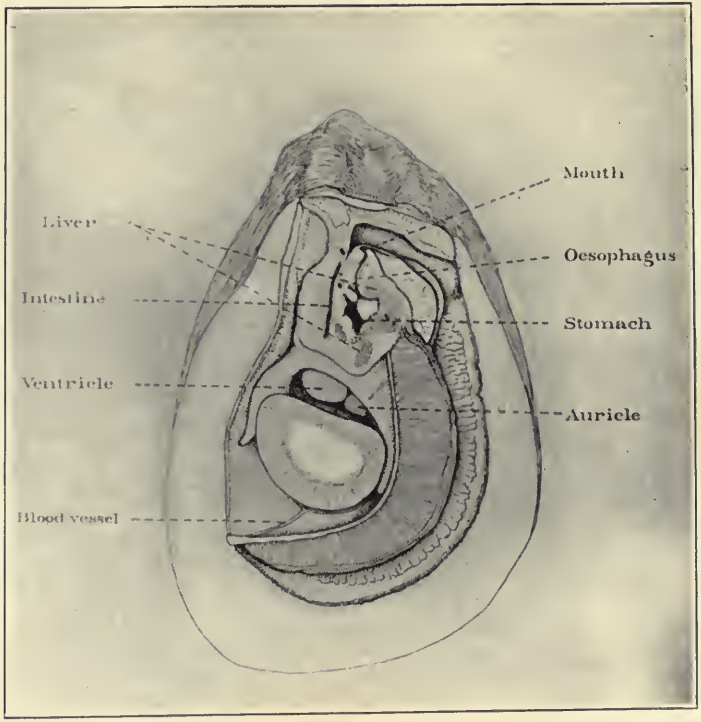


FIG. 14.

OYSTER AND SKETCH.

RIGHT SHELL, MANTLE, LIPS, PART OF BODY AND PERICARDIUM REMOVED.

7. One concrete "monument," such as is used by the Coast and Geodetic Survey to mark the location of the "Shore signals."
8. One "buoy" and "sinker," such as is used by the Commission to mark the corners of the natural oyster bars.

When the Exposition has closed it is the intention of the Commission to place its exhibit in the office at Annapolis.

FINANCIAL STATEMENT.

April 2, 1906, to September 30, 1907.

Receipts.

From State of Maryland—		
General Appropriation under Chapter 809, of the Acts of 1906		$25,000.00
Salaries of Commissioners and Chief Clerk under Chapter 809, of the Acts of 1906		6,800.00
Additional Appropriation under opinion of Attorney-General, being for salaries from May 10, 1906, to October 2, 1906, and not charged to General Appropriation, as follows:		
Walter J. Mitchell	$784.91	
Caswell Grave	706.45	
B. K. Green	706.45	
Swepson Earle	893.81	
H. C. Jenifer	362.90	
S. A. Harper	333.32	
		$3,787.84
Application Fee Fund		3,988.17
Record Fee Fund		730.00
Rent Fee Fund		1,667.43
*Bills Payable		8,000.00
		$49,973.44

Disbursements.

Salaries of Commissioners, Engineers, Counsel, Chief Clerk, Assistant Clerk and Local Oystermen:		
Walter J. Mitchell	$2,784.91	
Caswell Grave	2,506.45	
B. K. Green	2,506.45	
Swepson Earle	3,393.81	
W. G. Emory	1,490.00	
Thos. H. Robinson	1,875.00	
H. C. Jenifer	1,492.05	
S. A. Harper	1,333.32	
J. E. Smith	430.00	
T. S. Dougherty	305.00	
Carried forward		$18,116.99

*Money borrowed on faith of appropriation under Chapter 818, of the Acts of 1906, not available until October 1, 1907.

Amount brought forward	$18,116.99	$49,973.44
Expenses of Commissioners and Engineer	1,059.58	
†Labor	7,510.06	
Subsistence	5,034.65	
Advertising, printing and office supplies	1,032.35	
Buoys and boats	4,144.51	
Telephone	112.90	
Houseboat Oyster	8,750.58	
Jamestown Exposition Exhibit	151.72	
Postage, expressage and incidentals	586.44	
State Fishery Force	1,049.83	
Scientific and engineering supplies	593.78	
		$48,143.39
Balance		$1,830.05
Funds on hand—		
Bank of Somerset	$376.60	
Marine Bank of Crisfield	723.95	
State of Maryland	70.85	
Annapolis Banking and Trust Company	658.65	
		$1,830.05

†The following items are included in the labor account:

Ernest Reppenhagen, Draughtsman and Observer, salary from March 1, 1907, to September 30, 1907, at $75 per month	$525.00
Thomas H. Grave, Assistant Engineer, salary from June 1, 1907, to September 30, 1907, at $75 per month	300.00
H. E. Collins, Recorder in survey party, salary from May 25, 1907, to September 30, 1907, at $50 per month	211.29
Miss Blanche Richardson, Stenographer, salary from April 9, 1907, to September 30, 1907, at $10 per week	250.00
B. J. D. Bruff, Stenographer, one month's salary, for special work	75.00
Fred. J. Johnson, Surveyor, for services rendered in Surveying old oyster lots	28.00
	$1,389.29

ACTS—JANUARY SESSION, 1906—CHAPTER 711.

AN ACT to establish and promote the industry of oyster culture in Maryland, to define and mark natural oyster beds, bars and rocks lying under the waters of this State, to prescribe penalties for the infringement of the provisions of this Act, and to add new sections to Article 72 of the Code of Public General Laws, to follow Section 82, and to be designated respectively as Sections 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, and 119.

SECTION 1. Be it enacted by the General Assembly of Maryland, That the following sections be and they are hereby added to Article 72 of the Code of Public General Laws, title "Oysters," to follow section 82, and to be designated respectively as sections 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, and 119.

SECTION 83. Any resident of Maryland shall have the right to plant and cultivate oysters in the waters of this State; such right shall be exercised in the manner prescribed in the following sections of this Act, and shall be subject to the regulations, provisions and limitations hereinafter set forth, but no corporation, or joint stock company, shall be permitted to lease or take up, or to acquire by assignment, or otherwise, any lands of the State for oyster planting or cultivation. All natural beds or bars shall be excluded from the operation of this Act, and no person shall be permitted to plant or cultivate oysters thereupon, or in any way appropriate the same to his own use.

SECTION 84. The Board of the Shell Fish Commissioners of Maryland is hereby created. The said Board shall consist of three members, one of whom shall be a resident of one of the tidewater counties of the Eastern Shore of Maryland, another a resident of one of the tidewater counties of the Western Shore, and the third a resident of the City of Baltimore, and one of whom shall be a member of the minority party at the

time of their appointment. The term of each of the members of said Board shall be two years from the first Monday in May after his appointment. They shall be appointed by the Board of Public Works of the State of Maryland. No member of said Board of Shell Fish Commissioners shall be in any manner interested in any land leased or taken up for bedding, planting or cultivating oysters. The acts and duties to be done and performed by said Board under this Act may be done and performed by two of said Commissioners, and in all cases, the decision of a majority of the Commissioners shall be binding. One of said Commissioners shall be designated by the Board of Public Works of the State of Maryland as president, and his salary shall be Two Thousand Dollars a year. The salary of the other Commissioners shall be Eighteen Hundred Dollars a year. The said Commissioners shall be allowed to employ a chief clerk upon a salary of Twelve Hundred Dollars a year, and such assistants, not exceeding three in number, and not more than be absolutely needed for the performance of the work of the Board, at graded salaries, to be paid by the Commissioners, not to exceed One Thousand Dollars a year for any such assistants, as it may deem necessary to aid it in the proper performance of its duties, as prescribed in this Act. The said Commissioners shall employ a competent surveyor, who shall also be a hydrographic engineer, upon a salary to be named by said Commissioners not exceeding Twenty-five Hundred Dollars a year. If the Commissioners deem it expedient to employ a hydrographic engineer, who is also a biologist, capable of investigating oyster propagation, an engineer of such qualification may, in their discretion, be employed. The sum of Five Hundred Dollars per annum shall be appropriated, to be expended under the direction of said engineer, if he be a biologist, who shall, in that event, establish one or more stations for said investigation of oyster propagation. All salaries, outlays and disbursements authorized by this Act shall be paid out of the general treasury of the State of Maryland upon requisition made by the Board of Shell Fish Commissioners, endorsed by the Comptroller of the State, but the same shall be repaid out of the first revenues arising from the leasing of land for oyster culture contemplated by this Act. The Commissioners compos-

ing said Board shall, immediately after their appointment, file in the office of the Clerk of the Court of Appeals separate bonds, with a surety or sureties to be approved by the State Treasurer, in the sum of Ten Thousand Dollars conditioned for the faithful performance of the duties imposed by this Act. The said Commissioners shall take and subscribe before the Governor of the State an official oath prescribed by the Constitution. The said Commissioners shall have an office in the City of Annapolis.

SECTION 85. The Commissioners shall keep, at its office in the City of Annapolis, books of record, in which shall be recorded all leases, assignments and other conveyances of land to be used for the planting or cultivation of oysters in accordance with this Act. A set of clear and simple forms, for all subsequent conveyances of any kind, shall be prepared by the Board, with the advice of the Attorney General, and no title shall be vested in any lessee or transferee of any interest or estate acquired under this Act until the conveyance or conveyances evidencing such leases or transfers will have been recorded in the office of the Board of Shell Fish Commissioners.

SECTION 86. The Board of Shell Fish Commissioners shall, as soon as practicable, after the passage of this Act, cause to be made a true and accurate survey of the natural oyster beds, bars and rocks of this State, said survey to be made with reference to fixed and permanent objects on the shore, giving courses and distances, to be fully described and set out in a written report of said survey, as hereinafter required. A true and accurate delineation of the same shall be made on copies of published maps and charts of the United States Coast and Geodetic Survey, which said copies shall be filed in the office of the said Commissioners in the City of Annapolis; and the said Commissioners shall further cause to be delineated upon copies of the published maps and charts of the United States Coast and Geodetic Survey, of the largest scale one copy for each of the counties of this State in the waters of which there are natural oyster beds, bars and rocks, all natural beds, bars and rocks lying within the waters of such county, which maps shall be filed in the office of the Clerks of the Circuit Court for the respective counties, wherein the grounds so designated may lie.

The said survey shall be made by the hydrographic engineer employed by said Board, as provided in Section 84 of this Act, acting under the direction and control of the said Commissioners. The said natural beds, or bars, shall be marked by buoys, which shall be known as State buoys.

SECTION 87. The Governor of this State is hereby requested to ask the assistance of the United States Coast and Geodetic Survey, and of the United States Fish Commissioner, to aid in the carrying out of the provisions of the preceding section.

SECTION 88. The County Commissioners of each and every county in this State, in which there are natural oyster beds, bars or rocks, shall be authorized to appoint some resident of their said county, who is well acquainted with the situation and location of oyster beds, bars or rocks in the waters of such county, who shall aid the said Board by furnishing any information he may possess, concerning the situation and location of recognized oyster beds, bars and rocks in the waters of such county, and who shall accompany the said Commissioners and the hydrographic engineer appointed by said Board, but only within the limits of his county, in the making of the survey of the natural oyster beds, bars and rocks, as provided by this Act, the said appointee to receive a compensation of Five Dollars per day when actually so engaged.

SECTION 89. As soon as practicable after the first day of April, 1906, the said Commissioners shall organize and shall at once proceed, with the assistance of such person or persons as may be detailed by the United States Coast and Geodetic Survey, and the United States Fish Commissioner, to aid them in their work, and of such persons as may be appointed under the preceding section, to have laid out, surveyed and designated on the said charts, the natural beds, and bars, and shall cause to be marked and defined as accurately as practicble, the limits and boundaries of the natural beds, bars and rocks, as established by said survey, and they shall take true and accurate notes of said survey in writing, and make an accurate report of said survey, setting forth such a description of land marks as may be necessary to enable the said Board, or their successors, to find and ascertain the boundary lines of the said natural oyster beds, bars and rocks, as shown by a delineation on the maps and

charts provided in this Act; said report shall be completed and filed in the office of the Board in the City of Annapolis, within ninety days after the completion of the survey of any county. Said Commissioners shall cause the same to be published in pamphlet form, and transmit copies of the same to the Clerk of the Circuit Court for their respective counties, where the charts have been filed or directed to be filed, as hereinafter provided; the said report to be filed by the Clerks of the several counties in a book kept for that purpose. And the said survey and report, when filed, subject to the right of appeal hereafter provided for in this Act, shall be taken in all of the Courts of this State as conclusive evidence of the boundaries and limits of all natural oyster beds, bars and rocks, lying within the waters of the county wherein such survey and report are filed, and shall be construed to mean in all of the said Courts that there are no natural oyster beds, bars or rocks lying within the waters of the counties wherein such report and survey are filed, other than those embraced in the survey authorized by this Act, and that all areas of the Chesapeake Bay and its tributaries within the State of Maryland, not shown in the survey to be natural oyster beds, bars or rocks, shall be construed in all the Courts of the State to be barren bottoms, and open for disposal by the State for the purpose of private planting or propagation of oysters thereon under the provisions of this Act; provided that the said survey and report shall not be so construed as to affect in any manner the holdings by citizens of this State in any lot which may have been appropriated or taken up under the laws of this State prior to the approval of this Act.

Section 90. The said Board, in defining the natural beds and bars, shall exercise its judgment liberally in favor of the natural beds and bars, and allow a reasonable margin of the barren bottoms, rather than encroach on a natural bed or bar. The natural beds or bars shall be bounded by straight lines, even though some portions of barren bottoms may thus be necessarily included within such lines.

Section 91. If residents of any county, exceeding twenty-four in number, shall, within four months after the filing of said survey and report in such county, file in the Circuit Court for said county a petition, in writing, attested by the oath of some

one or more of the petitioners, alleging that five or more adjacent acres of oyster beds, bars or rocks, in such county, have been omitted from such surveys, or that five or more acres of barren bottoms have been included in such survey and designating the location of same by a plat, or as near as may be with reasonable certainty by such land marks as will locate and designate the beds alleged to have been omitted or included, a Judge of the Circuit Court for the said county, after due notice given to the Board of Shell Fish Commissioners, shall proceed to hear testimony and decide the case, as provided in the succeeding section, but this section shall not apply where the ground claimed by the petitioners has been legally taken up prior to the approval of this Act.

Section 92. Upon hearing a case presented by petition under the preceding section, the Judge shall determine the question whether the ground referred to in said petition is a natural bed or barren bottom, and his finding on said question shall be final, and shall be entered upon the records of the Board of Shell Fish Commissioners in their office in the City of Annapolis, and properly marked on the copies of the plate as hereinbefore required.

Section 93. Such amended survey shall be filed in the offices of the Clerks of the Circuit Court for the counties in which the original surveys hereinbefore provided are required to be filed, and when so filed, shall be conclusive evidence in all the Courts of this State as to whether the area embraced therein is or is not a natural oyster bed, bar or rock.

Section 94. Whenever a petition is filed in the Circuit Court for any county, as authorized in Section 91 of this Act, the parties so petitioning shall deposit Twenty-five Dollars, to be returned to the petitioners if the Judge shall determine in favor of the petitioners, but if the Judge shall determine adversely to the petitioners, then said sum to be applied, so far as necessary, to the payment of costs incurred in the proceedings under said petition, and the balance to be returned to said petitioners.

Section 95. The said Board shall be authorized to call to their assistance the County Surveyor of any county, whenever in their judgment his assistance is necessary, and shall pay him for his services such compensation as is authorized by law for his services in other proceedings.

Section 96. The Board of Shell Fish Commissioners shall cause an accurate survey of and delineation upon the maps and charts aforesaid of all bottoms of the tributaries of the Chesapeake Bay where grass grows and it is profitable to scrape for soft shell or shedder crabs, and shall have such bottoms properly designated by permanent objects on the shore, as provided hereinbefore for natural oyster beds, bars and rocks, which said crabbing sections shall be exempt from leasing for oyster culture.

Section 97. One of the steamers of the State Fishery Force shall be kept in commission under the command of the Deputy Commander and subject to the control and direction of the Commissioners from the first day of April in each year, until the first day of October following, to assist the Board in the performance of the duties imposed upon it by this Act, and the Deputy Commander in each of the several districts of this State shall also be subject to the control and direction of the said Commissioners during the closed season for the taking and catching oysters with rakes and tongs, during the time the said Commissioners shall be engaged in the respective districts in locating natural oyster beds, bars and rocks, and shall give the said Commissioners every assistance in their power.

Section 98. After the survey provided for herein shall have been completed, it shall be the duty of the Board of Shell Fish Commissioners to lease, in the name of the State of Maryland, tracts, or parcels, of land beneath the waters of this State, whether within the limits of the counties, or elsewhere, in the area to be opened for oyster culture, according to the provisions of this Act, provided that no tract so leased, if situated within the territorial limits of any county in this State, shall contain less than one acre of land, and if situated in any other place, no tract so leased shall contain less than five acres. It shall be the duty of said Commissioners to require that the tracts so leased shall be as nearly rectangular as is convenient. It shall be the duty of the said Commissioners to demand from each lessee payment of the rent each year in advance. No person shall be permitted, by lease, assignment, or in any other manner, to acquire a greater amount of land than ten acres situated within the territorial limits of any of the counties, or one hundred

acres in any other place. Leases shall be made only to residents of Maryland. The term of such leases shall be twenty years, and the annual rent reserved to the State shall be one dollar per acre for each of the first two years of said term of twenty years; two dollars per acre for the third year; three dollars per acre for the fourth year; four dollars per acre for the fifth year; and five dollars per acre during the remainder of the term. If any part of the rent reserved under such leases shall remain unpaid for more than six months, after the same becomes due, such lease or leases shall be declared void, and the land shall revert to the State, and may be leased again in accordance with the provisions of this Act. The said Commissioners may at the request of any lessee, if it shall appear equitable so to do, upon the cause shown in writing, cancel his lease as to the whole or a part of the lands leased.

Section 99. In case the survey provided for by this Act shall not have been completed within one year from the passage of this Act, then it shall be the duty of the Board of Shell Fish Commissioners to begin the leasing of barren bottoms in the manner, and upon the terms provided in the preceding section, provided that such leasing shall then commence only in those areas in which the survey provided for in this Act shall have been completed.

Section 100. For a period of four months after the said survey shall have been completed, or after any area shall have been opened to leasing under the preceding sections, citizens of Maryland, residing in any part of the State, who, at the time of the completion of said survey, or at the respective times of the opening for oyster culture of several areas, as the case may be, may be owners of land having a water front upon any part of the said areas so opened to oyster culture, shall have the exclusive right to rent any land opened to oyster planting under the provisions of this Act, adjacent to their lands. And for an additional period of six months, after the expiration of the said period of four months all boatmen, residents of this State, who shall be engaged in the business of dredging, scraping or tonging for oysters at the time of the completion of the said survey, or at the respective times of the opening for oyster culture of several acres, or if said survey shall be completed, or the said

areas shall be opened to oyster culture during the closed season for dredging, scraping or tonging, as the case may be, then the persons so engaged at the end of the last dredging, scraping or tonging season, shall have the like exclusive right in the order of their respective application, as the same may be received and opened by the Commissioners, to rent any adjacent lands, provided that in no event shall any such land owner, boatman or any other person, be permitted to rent or acquire more than ten acres, or one hundred acres, as the case may be, dependent upon the situation of the land which is leased or acquired; and provided further, that no such riparian land owner, as is mentioned in this section, shall be entitled to rent the amount of ten acres, or one hundred acres, as the case may be, unless the water front of the land so owned by him, if fronting on water within the territorial limits of a county, be at least two hundred yards, or if fronting on waters in any other place, be at least seven hundred yards. The owners of land having a less water front than is mentioned above shall be entitled to rent a proportionately less amount of land, dependent upon the length of the front upon water within county limits or elsewhere.

Section 101. Blank forms of application shall be furnished upon reasonable charges, to be prescribed by the Board of Shell Fish Commissioners, to any person desiring the same. All such forms shall be printed and shall be substantially in the following languages: Application for a lease to the Board of Shell Fish Commissioners of Maryland. The Application of..... ....., a resident of ..... County, in the State of Maryland, respectfully shows that he is a resident of said State; that he wishes and intends to use the grounds hereinafter described for planting or cultivating oysters. He therefore requests that said Board lease to him, in the name and on behalf of the State of Maryland.....acres of ground located under the waters of the State of Maryland, which ground is more particularly described as follows, to wit: (Describe here). Dated at ....., Maryland, this .....day of .... A. D. ....., Applicant.

Section 102. When the period of ten months will have elapsed after said survey shall have been completed, or after the

lands beneath the waters of any area shall have been opened to leasing under Section 99 of this Act, the Board of Shell Fish Commissioners shall endeavor to lease the remaining portions of land so open to oyster culture under the provisions of this Act to applicants who shall be residents of Maryland, in the order of their applications as received and opened by said Commissioners.

SECTION 103. Any person who may desire to plant and cultivate oysters in the area hereinbefore designated shall file with the Board of Shell Fish Commissioners an application substantially in the form prescribed in Section 101 of this Act. The applicant shall indicate plainly the location of the land he desires to lease. The application shall be sworn to before a Justice of the Peace of this State. A fee of five dollars shall be paid by the applicant to the Board of Shell Fish Commissioners at the time of filing the application, which fee shall be returned to the applicant if his application shall be for any reason declined.

SECTION 104. If such applicant be a resident of the State of Maryland, and if no objections to the issuing of the lease asked for in any such application be filed with the Commissioners within the period of thirty days after such application is made, or as soon as any objection that may have been filed to the granting of such lease will have been finally overruled by said Commissioners, the said Commissioners, upon payment by the applicant of a further fee of two dollars and a half, in addition to the fee of five dollars, which is to accompany his application, shall cause to be entered in a book or books to be known as "The Register of Title to Oyster Lands," the name of the applicant, with concise but clear description of the land applied for. A survey of such land at the expense of the applicant shall be made by the Board before the entry, if, in its opinion, said survey is necessary to an accurate description thereof. The payment of the proper fees due for the application and the record in the register required by this section to be kept, shall constitute between the State and the applicant the relation of landlord and tenant for the term of twenty years, from the record of the lands so applied for as aforesaid, at the annual rentals provided in Section 98 of this Act.

Section 105. The relation of the landlord and tenant, stated in Section 104, shall have all the incidents attaching to that relation as the same exists under the laws of Maryland, excepting only the following particulars: First, the only remedy of the State for non-payment of the rent of oyster lands shall be the strict enforcement of the provisions set forth in Section 98 of this Act. Upon the non-payment of any rent for the time therein mentioned, it shall be the duty of the Board of Shell Fish Commissioners, after a written notice of not less than ten days to the lessee, to declare the lease vacated by stamping the word "Void" in distinct letters across the description in the register; second, land leased under this Act shall be used only for the purpose of planting and cultivating oysters; third, no right shall exist to redeem or purchase any land of the State so leased; fourth, any other modifications caused by the provisions of this Act.

Section 106. The Commissioners shall at once notify the lessee of the record in the register required by Section 104, and the lessee shall, as soon thereafter as practicable, not exceeding thirty days from the receipt of said notice, cause the ground designated as leased to him to be plainly marked out by stakes, buoys or monuments, under the supervision of the Commissioners. At least four of such stakes, buoys and monuments shall have the initials of the lessee plainly marked upon them, and such stakes, buoys or monuments shall be at all times during the existence of said lease continued by the said lessee or his legal representative.

Section 107. This Act is not intended to apply to any lands owned by private persons, the bounds of which extend below low water into or beneath the waters of this State. This Act shall not be so construed as to apply to any creek, cove or inlet, less than one hundred yards in width at its mouth at low tide.

Section 108. Any person who has, prior to the passage of this Act, lawfully appropriated or taken up any land in this State, for the purpose of planting, bedding or cultivating oysters thereon, may become a lessee of said land for the term of twenty years from the passage of this Act, with all the incidents, including the payment of the rents of the leases contemplated by this Act, provided such person gives written notice to

the Board of Shell Fish Commissioners of his intention to become such lessee within six months after the passage hereof. The holding of any person who may have appropriated any such land shall become void and of no effect in law, upon the expiration of the said period of six months from the passage hereof, if no such notice of intention will have been given within said period of six months.

SECTION 109. The lessee of any land leased for the purpose of planting and cultivating oysters shall have exclusive ownership of and title to all oysters planted by him or existing on the land leased.

SECTION 110. No assignment or transfer of any interest acquired by this Act shall be valid for any purpose if made to a non-resident of this State. If any such assignment is attempted to be made, all interest of the grantor, or assignor, shall revert to the State as if no lease had ever been made. If any assignment of any interest created by this Act is attempted to be made to any corporation or joint stock company, all the interest of the grantor or assignor shall revert to the State as if no lease had ever been made. If any assignment of any interest created by this Act is attempted to be made to any person in such a way that the assignee shall become the holder of more than ten acres, or one hundred acres, as the case may be, according to the location of land leased under this Act, all interest of the grantor or assignor, in case of such an assignment, shall revert to the State as if no lease had been made.

SECTION 111. It shall be lawful for any tonger, between the 15th day of April and the 15th day of May in any year to take oysters from such natural beds or bars in the tonging districts of the Chesapeake Bay and its tributaries, as the Commission may mark out for that purpose, and under such regulations as said Commission may from time to time prescribe; provided, however, that said oysters may be sold only for the purpose now permitted under existing laws of Maryland, during the season of the year above mentioned; and in addition thereto, to persons engaged in the industry of planting and cultivating oysters within the area designated by this Act, the same to be delivered only upon lands which may have been leased under

the provisions of this Act for such purposes of planting or cultivating.

SECTION 112. It shall not be necessary for any holder of oyster land under this Act to take out any license for dredging, scraping or tonging oysters on any land so held by him, and oysters on such land may be taken in any manner and at such times as may be desired by the holder of such land as allowed by the existing laws of this State.

SECTION 113. Any person who shall wilfully and without authority take or remove oysters from any land leased under the provisions of this Act, or shall wilfully injure or interfere with the oysters of such land in any manner, or injure the oysters thereupon situated, or remove, alter or interfere with the stakes, buoys or monuments marking the same, shall, upon conviction thereof, for the first offense, be sentenced to imprisonment in jail or in the penitentiary, in the discretion of the Court, for not less than three months and not more than two years, and for the second, or any subsequent offense, be sentenced to imprisonment in the penitentiary for not less than two years and not more than five years.

SECTION 114. Any person who shall work a dredge, scrape or pair of tongs, or any other implement for the taking of oysters upon any land leased under the provisions of this Act without the consent of the lessee or owner, or who shall, while upon or sailing over any such ground or bed, cast, haul or have overboard any such dredge, scrape or pair of tongs, or other implement for the taking of oysters, under any pretense or for any purpose whatever, without the consent of such lessee or owner, upon conviction thereof, shall, for the first offense, be fined not less than fifty dollars, nor more than two hundred and fifty dollars, in the discretion of the Court, be imprisoned in jail, or in the penitentiary for not less than three months, nor more than one year, or shall be both so fined and imprisoned, and for the second, or any subsequent offense, shall be sentenced to imprisonment in the penitentiary for not less than two years nor more than five years.

SECTION 115. Any person who shall make his boat fast to a State buoy, or remove the same, or in any manner interfere therewith, the same shall, in the discretion of the Court, upon

conviction thereof, be sentenced to the penitentiary for a term of not less than one year or more than two years.

SECTION 116. In addition to other penalties herein provided, any person convicted of a violation of this Act under either of the three preceding sections, shall be, and is hereby, denied the right to take out any license to dredge, scrape or tong for oysters in any waters of this State, for the period of three years after said conviction.

SECTION 117. It shall be the duty of all officers and members of the State Fishery Force to arrest persons violating this Act, and to patrol such waters of the Chesapeake Bay and its tributaries as they may be directed by the Board of Public Works to patrol, for the purpose of preventing violations of this Act.

SECTION 118. The revenues arising from the operation of this Act shall be applied in the following manner: First, to the payment of all salaries, expenses, surveys, outlays and disbursements authorized by this Act; second, the balance, if any, to be paid at the end of each year into the Treasury of the State, leaving, however, a balance at the end of each year of Ten Thousand Dollars with the Board of Shell Fish Commissioners, to be applied to the current expenses of its office for the ensuing year. All moneys so paid as aforesaid into the Treasury of the State shall be placed to the credit of a special fund, called the "Special Road Fund."

SECTION 119. The Board of Shell Fish Commissioners shall annually prepare and publish in pamphlet form a full report of its transactions during the year prior thereto, as well as a statement of the operations of this Act, and an account of the receipts and disbursements hereunder. The said report shall also contain a detailed statement of the lands leased under this Act, with the names of the lessees. The said Commissioners shall also in its report make such recommendations as it may deem proper concerning further legislation or changes in the present oyster laws, and shall present the said report to the General Assembly of Maryland.

SEC. 2. And be it enacted, That this Act shall take effect from the date of its passage, and all laws of Maryland incon-

sistent with this Act shall be, and the same are hereby, repealed.

Approved April 2d, 1906.

THE GREAT SEAL
OF
MARYLAND.

EDWIN WARFIELD,
Governor.

JOSEPH B. SETH,
President of the Senate.

CARVILLE D. BENSON,
Speaker of the House of Delegates.

State of Maryland, Set.:

I, Thomas Parran, Clerk of the Court of Appeals of Maryland, do hereby certify that the foregoing is a full and true copy of the Act of the General Assembly of Maryland, of which it purports to be a copy, as taken from the Original Law belonging to and deposited in the office of the Clerk of the Court of Appeals aforesaid.

SEAL.

In testimony whereof I have hereunto set my hand as Clerk, and affixed the seal of the said Court of Appeals this 23d day of May, A. D. 1906.

THOMAS PARRAN,

Clerk Court of Appeals of Maryland.

JURISDICTION.

Chapter 711 of the Acts of 1906 has no application to the natural oyster beds and bars located in the waters of the State of Maryland, except to provide for their survey and delineation upon maps and charts of the United States Coast and Geodetic Survey of the largest scale and providing a copy for each of the counties of this State in the waters of which natural beds, bars and rocks are located as set forth with great detail in said Act and subject to the right of appeal as therein provided, the action of the Shell Fish Commission shall be conclusive evidence of the boundaries of all natural oyster beds, bars and rocks. All the areas of the Chesapeake Bay and its tributaries and the waters of the State within the State of Maryland not shown in said survey to be natural oyster beds, bars or rocks shall be construed in all the courts of the State to be barren bottoms, and it is with this part of the land owned by the State and covered with water that the Act above referred to applies as well as to land lawfully appropriated or taken up for the purpose of planting, bedding or cultivating oysters thereon as provided in Section 108 of the Act.

EXTENT OF HAMAN LAW—PATUXENT RIVER LEGISLATION.

And as to the said barren bottoms and land lawfully appropriated under the Five Acre Acts, Chapter 711, of the Acts of 1906, is the only law regulating the rights of citizens of Maryland to become lessees of the same, providing the terms and conditions upon which they may plant and cultivate oysters, with the exception of the provisions of Chapter 367 of the Acts of 1906, which pretends to legislate in reference to the lands under the water of the Patuxent River in Calvert County. This being a local law for that river in Calvert County, somewhat similar in its provisions to the general law above referred to known as the Haman Bill, it is at least very doubtful whether

its effect would be to interfere with the provisions of Chapter 711 of the Acts of 1906, and may have to be finally determined by the courts.

PRIVATE OWNERSHIP AND RIPARIAN RIGHTS.

One of the questions of considerable interest to land owners bordering on the waters of the State is as to the extent of their rights on the shore. Section 107 of this Act provides that it is not intended to apply to any lands owned by private persons the bounds of which extend below low water into and beneath the waters of the State, it being the intention of the Act to protect the rights of land owners under old grants from the State prior to 1862 who may have acquired the right from the State to any land covered by navigable water. It is believed that the extent of this private ownership is very small, but whenever it does exist and the title can be established, the rights of the owner are exempt from the operation of this Bill to the extent of their holdings. Chapter 129 of the Acts of 1862 expressly prohibits the right to issue any patent to land covered by navigable water, and the rights of land owners bordering on the shore of the navigable waters of the State, with the possible exception above referred to, extend to high-water mark and the land covered by water within the ebb and flow of tide to high-water mark belongs to the State and is the subject of lease under the provisions of this act.

Another question of interest akin to this is where a tract of land lies adjacent or contiguous to a navigable river or water, as to the interest of the owner of the land in any change in the shore line and the rule adopted by the Commission which is in conformity with the decision of the Courts is that any increase of soil gained from the sea either by alluvion, the washing up of sand and earth so as in time to make terra firma, or by dereliction, as where the sea shrinks back below the usual water mark, in these cases it is held that if this gain be little and little by small and imperceptible degrees it shall go to the owner of the land adjoining, and that the ownership of land may be lost by erosion or submergence, the one consisting of the gradual eating away of the soil by the operation of currents and tides and the

other by its disappearance under the water and the formation of a navigable body over it, and the reason for the rule allowing the owner of the land to claim all that is acquired by alluvion or dereliction is to make up for the possible losses he may sustain by the sea encroaching upon his holdings. In one case brought to the attention of the Commission a grant of 2,000 acres of land under a patent issued in 1867 was found by a recent survey to contain only 1,850 acres, the waters on the shore of this property having by imperceptible degrees encroached on the owners during that long period until one hundred and fifty acres of land was apparently under the navigable waters of the State, and it was held that the owners' rights could not extend below high-water mark as it now exists.